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978 897 7100
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February 15, 2019

Subject: Union Square Redevelopment (EEA #15889)

Dear Reviewer:

At the request of the MEPA office, additional responses to comment letters received on the Environmental Notification Form for the Union Square Redevelopment project (EEA #15889) are being sent to you.

In addition, to allow for additional time to review the Draft Environmental Impact Report (DEIR) and additional responses, the Proponent has requested that the comment period be extended to March 1, 2019.

If you wish to submit comments on the DEIR, they should be emailed to the MEPA Analyst, Alex Strysky, at: alexander.strysky@mass.gov or sent to the address below:

Secretary, Matthew A. Beaton
Attn: MEPA Office, Alex Strysky
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Sincerely,

EPSILON ASSOCIATES, INC.

Geoff Starsiak
Associate

REF
307.
121
UN

LIST OF COMMENT LETTERS

Brendan C. Harris
Gregory W. Hill
Mia Lambert
Jacinta Areme
Valerie Zinkus
Mary Jo Conelly
Penelope Taylor
Sandra Brown
Green and Open Somerville
Bill Cavellini
Tori Antonino
Jacob Kramer
Wig Zamore
Rachel Weil
Malcolm Cummings
Anson Stewart and Mike Firestone

#15889

Dear Secretary Beaton,

I am a resident of the Union Square neighborhood in Somerville, MA, and I am writing to you today to urge you to reject US2's MEPA waiver request for the Union Square D-2 Parcel. As you may be aware, Union Square is currently undergoing a major redevelopment which was approved by MEPA 5 years ago in 2013. Since then, there have been significant changes to the scope of the development which the developer has proposed based on feedback from local residents. I believe the environmental considerations of this major redevelopment must be considered based on their current plans, not on the original, outdated plans. BCH.1

Thank you,
Brendan C Harris
106 Concord Avenue
Somerville, MA

RECEIVED
JUL 16 2018
MEPA

BHC.1 **Review based on updated project plans.**

The DEIR includes analysis of environmental impacts related to the current Project plans.

RECEIVED
AUG 10 2018
MEPA

August 8, 2018

Dear Secretary Beaton -

I am writing to request that you deny the waiver submitted by Union Square developer USQ (EEA-15889) for Phase I of the Union Square Redevelopment Project.

In terms of Traffic + Parking too many parking spaces are proposed. Traffic is already backed up to the next traffic light on Prospect + Webster Streets. Air pollution will increase a lot exponentially. GWH.1

Thank you,

Gregory W. Hill
24 Walnut Street
Somerville MA 02143

GWH.1 **Traffic and parking spaces.**

Section 4.5.6 of the DEIR describes the proposed parking supply and management for the Project established following the Union Square Neighborhood Plan and recent zoning. The Project seeks to provide parking that serves the proposed development and adjacent neighborhood without incentivizing driving, and that is as efficiently utilized as possible in order to meet the goals of the Union Square Neighborhood Plan.

Chapter 4 of the DEIR includes a motor vehicle analysis (Section 4.5.5) as well as measures that the Project will implement to minimize vehicle trips (Sections 4.5.7 and 4.5.8).

RECEIVED

AUG 10 2018

MEPA

Dear Secretary Matthew Beaton,

I am a resident of Somerville and someone who has worked in Union Square. I have friends and acquaintances who live in Union Square.

I am writing to urge you to deny US2's request for a waiver for Phase 1 of the Union Square Redevelopment Project (EEA #15889) for several reasons.

Regarding traffic and parking: there is already significant traffic backup in Union Square. Adding 300 new parking spaces in Phase 1 will only add to this problem and will extend into other areas beyond the boundaries of Phase 1/the D2 site. More traffic means greater air pollution. A full environmental review with more comprehensive data on the effects of this increase in traffic is imperative. We deserve breatheable air in Union Square. M1.1

Regarding flooding: the current storm and wastewater infrastructure in Union Square is insufficient even though the developer claims otherwise. We know this because local businesses (ex. SCATV) flood every time there is a big storm. The City of Somerville has responded to this problem through a largely State-funded pipe redevelopment project to reroute pipes so that stormwater and wastewater no longer flow through the same pipes. However, ML.2

this project is ongoing and without a full environmental review there will be no way to know whether these changes will be enough to account for the massive increase in wastewater production that will be brought about by Phase 1 of the development. Furthermore, Phase 1 will greatly increase the amount of impervious surface area on the D2 site which will likely increase storm water runoff as well.

Regarding land contamination: there is significant soil contamination on the Phase 1 site. There has been some cleanup and the developer plans to do more, but will not remove all contaminated soil, rather "capping" contaminated areas with concrete. This is dangerous because Union Square is in a flood plain and the contaminated soil under these "caps" can be carried into "uncapped" areas, whether in or beyond the Phase 1 site. Exposure to contaminated soil can have serious chronic health repurcussions. Capping is simply an unacceptable solution to contamination, unless a full environmental review can prove otherwise. We deserve a healthy and safe environment in Union Square. ML.3

Thank you for considering my concerns. I hope that you will deny US2's request for a Phase 1 waiver.

Sincerely,

Mia Lambert, Somerville resident

ML.1 **Traffic and related air pollution.**

Chapter 5 of the DEIR includes an analysis of air quality impacts, and explains the purpose and methodology of the mesoscale analysis. In addition, Sections 4.5.7 and 4.5.8 include information regarding the Project's proposed measures to minimize vehicle use.

ML.2 **Area flooding.**

Chapter 9 of the DEIR provides information about existing and proposed storm drain infrastructure, as well as stormwater management. In addition, Section 10.1.3 includes information regarding infiltration and inflow mitigation. Lastly, Section 1.1.2, Streetscape and Infrastructure Improvements, includes additional details about the City's expansion of neighborhood stormwater infrastructure and the Project's contributions to that effort.

ML.3 **Capping contaminated soils.**

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

RECEIVED
AUG 10 2018
MEPA

Somerville, August 13, 2018 -

Dear Secretary
Matthew BEATON

I'm very worry for the waiver requested by US2 to the UNION Square redevelopment Project (EEA# 15889).
Please, considere to:
deny waiver for phase 1

JA.1
- Too many parking spaces proposed
- Air pollution will increased potentially

JA.2
- Soil contamination
- Plan to control hazardous soil pollution means ("CAP")
- Some contamination will remain for long time
- capped contaminated soil
is especally dangerous in:
a Flood plain like Union Sq.

More testing (soil)
to show that Water Table is NOT moving in direction that would bring contaminants into open spaces (used by children and elders)
Open Spaces - no asfalt or concrete - green permeable

JA.3
Thank you, Mr. secretary for your attention.
Jacinta Arene

JACINTA AREME

JA.1 Parking spaces.

Section 4.5.6 describes the proposed parking supply and management for the Project established following the Union Square Neighborhood Plan and recent zoning. The Project seeks to provide parking that serves the proposed development and adjacent neighborhood without incentivizing driving, and is as efficiently utilized as possible in order to meet the goals of the Union Square Neighborhood Plan.

JA.2 Contaminated soil.

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

JA.2 Open space.

The Union Square Overlay District Zoning was adopted to codify the Neighborhood Plan targets and requires the Proponent to create more open space and public realm (25%) than what was recommended by the Neighborhood Plan (15%). As part of the open space and public realm improvements, the approved plan will deliver over 2.5 acres of new, public civic spaces (see Section 1.2.2, Civic Spaces for an overview). Section 6.6.1 also describes how the new civic spaces will incorporate landscape, add permeable hardscape and add to the urban tree canopy to combat climate change effects and improve neighborhood livability.

RECEIVED
AUG 10 2018
MEPA

August 9, 2018

Dear Secretary Matthew Beaton,

I am writing to ask you to deny the waiver for phase 1 of Union Square Redevelopment Project [EEA # 15889]

The current infrastructure for storm water and sewage can't handle additional loads. VZ.1

Traffic is already backed up and additional cars will increase air pollution exponentially. VZ.2

Plan to cap hazardous soil pollution means some soil will remain for a very long time. Contaminated soil is dangerous in a flood plain like Union Square. More soil testing needs to be done. VZ.3

Thank you,

Valerie Zinkus
56 Wheatland St #3
Somerville, MA 02145

VALERIE ZINKUS

VZ.1 Infrastructure.

Chapters 9 and 10 of the DEIR include a discussion of existing and proposed stormwater and wastewater infrastructure. Section 1.1.2, Streetscape and Infrastructure Improvements, also includes additional details about the City's expansion of neighborhood stormwater infrastructure and the Project's contributions to that effort.

VZ.2 Traffic.

Chapter 4 of the DEIR includes a motor vehicle analysis (Section 4.5.5) as well as measures that the Project will implement to minimize vehicle trips (Sections 4.5.7 and 4.5.8).

VZ.3 Contaminated soil.

Chapter 8 of the DEIR includes information regarding site conditions and plans to achieve a level of No Significant Risk.

RECEIVED
AUG 13 2018
MEPA

August 8, 2018

Dear Secretary Beaton,

I am writing to urge you to reject USS's application for a waiver of the full study for Phase 1, D2 of their Somerville Union Square Project (EEA 15887).

I am especially concerned that the infrastructure is inadequate to support Phase 1. The D2 site is significantly contaminated, and being in an area that frequently floods is especially dangerous. Union Square buildings equally are in a flood plain and basements flood frequently. (I will include a photo of a flooded basement in the Somerville Media Center at 90 Union Square (directly across Somerville Ave from D2) on July 27, 2018.)

Somerville children already have a high rate of asthma, which is

MJC.1

exacerbated by exposure to mold that grows in damp areas such as Union Square. It is also worsened by exposure to auto pollution which will increase under the Phase One plan, which has many more parking spaces planned in 5 new garages.

As a resident, I have many other concerns about the environmental impact of this project, but the most serious are outlined above. The project also doesn't propose much remediation or design features that would offset these problems, for example open space, permeable surfaces.

MJC.2

Thank you for considering my concerns and denying this waiver.

Sincerely,
Mary J. Connelly
36 Marshall St.
Somerville, MA 02145

MARY JO CONELLY

MJC.1 Infrastructure.

Chapters 9 and 10 of the DEIR include a discussion of existing and proposed stormwater and wastewater infrastructure. Section 1.1.2, Streetscape and Infrastructure Improvements, also includes additional details about the City's expansion of neighborhood stormwater infrastructure and the Project's contributions to that effort. Lastly, Section 6.6.1 describes how the new civic spaces will incorporate landscape, add permeable hardscape and add to the urban tree canopy to combat climate change effects and help manage stormwater.

MJC.2 Contaminated soil.

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

10 August 2018

RECEIVED
AUG 15 2018
MEPA

Dear Secretary Beaton,

I write urging you to deny the waiver that USZ applied for, EEA #15889, in Union Square, Somerville, for Phase 1 of Union Sq. redevelopment project, D2.

The potential environmental impacts from Phase 1, taken alone, are significant. For starters, the plan to "cap" hazardous soil pollution means some contamination will remain for a long time. This is especially alarming in a flood plain like Union Square. A big unknown are chronic exposure repercussions with any contamination. More soil testing must be required. PT.1

At 300, too many parking spaces are proposed. PT.2 Traffic is already significant, PT.3 backed up to the light at Webster and Prospect. Air pollution will increase. It's raining as I write, in Union Sq. we have flood warnings. The current infrastructure for storm water and sewage cannot handle additional loads brought on by Phase 1. One element that lessons the load of flooding is permeability— PT.4 and there are insufficient permeable surfaces in Phase 1. Green space is not asphalt, turf, or concrete, but permeable grass, flowers, gravel, trees.

Please deny this waiver.

Sincerely,

Penelope Taylor
8 Quincy St. #2
Somerville 02143
penelope.a.taylor@gmail.com

PENELOPE TAYLOR

PT.1 Contaminated soil.

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

PT.2 Parking spaces.

Section 4.5.6 describes the proposed parking supply and management for the Project established following the Union Square Neighborhood Plan and recent zoning. The Project seeks to provide parking that serves the proposed development and adjacent neighborhood without incentivizing driving, and is as efficiently utilized as possible in order to meet the goals of the Union Square Neighborhood Plan.

PT.3 Traffic and air pollution.

Chapter 5 of the DEIR includes an analysis of air quality impacts, and explains the purpose and methodology of the mesoscale analysis. In addition, Sections 4.5.7 and 4.5.8 include information regarding the Project's proposed measures to minimize vehicle use.

PT.4 Flooding.

Chapter 9 of the DEIR provides information about existing and proposed storm drain infrastructure, as well as stormwater management. In addition, Section 10.1.3 includes information regarding infiltration and inflow mitigation. Section 1.1.2, Streetscape and Infrastructure Improvements, also includes additional details about the City's expansion of neighborhood stormwater infrastructure and the Project's contributions to that effort.

Sandra Brown
25 Mansfield street
Somerville, Ma 02143
Apt 14

RECEIVED
AUG 15 2018
MEPA

Sunday 8, 12, 2018

Dear Secretary Matthew Beaton,

I am writing this letter urging you to decline the Phase 1 wavier for the union Square Redevelopment Project Requested by USZ. The Current traffic Congestion and lack of parking space is overwhelming, stressful and unhealthly! Waiting for the walk Sign can be up to 3-5 minutes, driving from my house to our local supermarket less than a 1/2 mile away can take 30 minutes on a clear and sunny day! Air pollution is also a major concern of mine. The constan stopping and starting in traffic burn fuel at a higher rate whic i feel does contribute to air pollution. Under the union Square Redevelopment Project EEA 1589, there will be a substantially

SB.1

a overwhelming amount more traffic in union Square!!!

Secretary Beaton. I hope and pray that you will please consider the Dire Affect the phase 1 wavier will have on our community. please do not [redacted] Grant the phase 1 wavier that's been Requested by USA for the EEA15559.

thank you!

Sincerely,

Jenifer Brown

SB.1 Traffic.

Chapter 4 includes an analysis of existing and future traffic conditions, as well as mitigation measures. Chapter 5 of the DEIR includes an analysis of air quality impacts, and explains the purpose and methodology of the mesoscale analysis.

Tuesday August 21, 2018

Matthew Beaton, Secretary

Executive Office of Energy and Environmental Affairs
Attn: MEPA Office / MEPA Analyst Alex Strysky
100 Cambridge Street, Suite 900
Boston MA 02114

Via email to Mr. Alex Strysky

RE: ***EEA#15889, ENF, Union Square Redevelopment, Somerville MA***

Dear Secretary Beaton,

The proponent US2 and SRA are requesting a phase 1 waiver for the Union Square Redevelopment in Somerville MA. Green and Open Somerville, an environmental activist group submit our commentary below.

The importance of getting as this project right should be the main driver for the developers and the community. But since this is not always the primary concern of developers, the community needs to hold this process to account. We must be responsible to the current and future populations of Somerville. We must take our responsibilities of being attentive stewards of the land and this process seriously. We must have as much oversight as possible to create a sustainable and healthy Union Square.

Because of the impacts on climate change, the way we build now determines our survival as a species. Union Square must to ready for all the changes in weather patterns that will come and our built environment must be able to withstand this, otherwise why are we even building in this floodplain. This is a never before experienced moment in human history. Skipping steps that would reduce the number of agencies paying attention to this project, reduces our chances of getting it right. Our built environment determines our future.

Here's why US2's request for a waiver should not be granted.

Onsite pollution from traffic

GLX largest light rail investment in 60 yrs. Union Square station represents the single largest investment of a light rail single station in at least 60 yrs. The degree to which the benefits of the T station is dependent on the design and execution of development of the D2 parcel especially the public open spaces cannot be overstated.

It is clear that the initial filing is not optimal. Because D2 lies between the new station and the heart of Union Square and its revitalization, the accommodations of travel to and from the station need to be as welcoming and efficient as possible, with the public space facilitating those connections, especially parks and the plaza. In the best case there would be large public space in the center of D2 away from the noisy polluted busy streets like Prospect St. Protected open space GOS.1

in middle will be most valuable to everyone healthfully, fiscally and aesthetically. It creates an immediate sense of place.

Garages could be on the periphery or underground, but not in the middle of this development. GOS.2

SRA and US2 have had many years in which to investigate and determine the types and extents of onsite pollution. Their likely evolution in time and how best to minimize human and natural impacts from that pollution and the implications for design of the parcel have yet to be determined because we don't have that information yet. (we don't have that knowledge to derive the impact).

It is of significance that US2 went above the EIR threshold in trips generated and in parking.

Union square traffic does not function well now, and is not going to function well anytime in the future. We would look forward to working with the developer on this to come up with solutions to reduce car uses and to work with the city to find ways to encourage more sustainable transportation, walking, biking, public transport etc. We appreciate the continued engagement of MEPA office consistence with its obligations and responsibilities both to the population and the other state agencies involved. GOS.3

Surrounding Neighborhoods

We do not believe that the full possible extent of impacts on surrounding properties and people have yet been studied and we would appreciate the involvement of the city of Somerville and the state agencies to assist in figuring this out. GOS.4

The city and the SRA have an interest in extensive redevelopment of the D Parcels in Union Square, Boynton yards and the Target site, which directly surrounds the neighborhoods. These include properties on Allen, Linden, Charlestown and Merriam Street. These residential neighborhoods will be severely impacted if the current design of D2 were to proceed with its giant 3 story above ground garage (300 parking spots) looming over and abutting the backyards of the long-term property owners of Allen street.

This neighborhood has been under-represented throughout this process.

These neighborhoods offer a large opportunity of higher density, more energy efficient multiunit family housing in a greener environment. For that to occur the D2 parcel and the other designated parcels need to be designed in the way that enhances the development of that neighborhood instead of squelching it. GOS.5

Poor design of the D2 parcel has negative environmental impacts

The Union Square Neighborhood Council recently made a proposal regarding the D2 design. We ask the city and the developers **that any final design for the D blocks support certain principles exemplified in the alternate designs of D2. Namely that:** GOS.6

- **parking be underground**
- **there be a physical and visual connectivity between US and T station**
- **the D2 plaza be at the interior of the D2 parcel protected by buildings**

- **a consideration of future development of Allen St, Merriam St, and Linden St**
- **Civic space be programmable**
- **There be connectivity of green space and publicly accessible nature of any open space**

These proposals are not reflected at all in the current D2 design!

Below is the link to our alternate designs from the community which the proponent is NOT considering.

http://unionsquareneighborhoodcouncil.org/images/docs/180813-D2%20Site%20Design%20Alternatives.pdf

Arguments from US2

The proponents are citing hardship and are arguing that they want their project be granted this waiver so that construction can be coordinated with that of the Union Square T station. But US2 has not promised that they would deliver by that date neither collaterally, nor fiscally. The T is not dependent on private development. It will proceed with the ability for other development to proceed.

In conclusion, we know that the best possible future can only be created through the collaboration of the city the community and the developers. We look forward at working with the city, the developers and the community to create the best design possible for the financial and environmental sustainability of Union Square.

We recommend that the MEPA office not grant this waiver.

Sincerely,

Green and Open Somerville

Tori Antonino

Renee Scott

http://greenopensomerville.blogspot.com/

GOS.1 **Accommodations for new GLX station.**

The Proponent has been meeting regularly with the MBTA, the GLX contractor, and the City of Somerville and is working with the parties to ensure that design for D2 and the Union Square Station provides efficient access to the station. The D2 plan includes a public plaza/open space of over 15,000 square feet that will provide a connection between Union Square Station and the Prospect Street sidewalk. The plaza will include an ADA path to and from the station, permeable areas, landscape areas and new tree canopy.

GOS.2 **Parking garages.**

Section 1.2.2 'Civic Spaces' provides additional information about the Proponent's evaluation of alternative D2 open space locations and underground parking as well as the Proponent's efforts to increase the size of and improve the quality of the D2 civic space/open space in response to community feedback.

GOS.3 **Traffic.**

The Proponent will continue to work with the City and neighborhood to encourage alternative modes of transportation and reduce car use, consistent with the recently completed Union Square Neighborhood Plan, the Union Square Overlay District Zoning and the approved Coordinated Development Plan. Chapter 4 includes an analysis of existing and future traffic conditions, as well as mitigation measures.

GOS.4 **Impacts on the surrounding neighborhoods.**

As noted in Section 1.2.2 of the DEIR, the Project is part of the state-approved Union Square Revitalization Plan, an urban renewal plan (M.G.L. Chapter 121B) that focuses on transit connectivity in order to prepare the area for economic development. The DEIR and the ENF submittal include information about the 10-year public planning and review process that has resulted in the current plan. This process started at City-wide scale with SomerVision and then moved to Neighborhood-scale with the Union Square Neighborhood Plan and now to Project-scale with the Coordinated Development Plan. The community's goals, including maximizing neighborhood benefit and minimizing neighborhood impacts have been a consistent driver in the process.

GOS.5 **D2 design.**

The Proponent continues to work through the public Design and Site Plan Review process for D2 as required by zoning. Other Blocks will go through Design and Site Plan Review once they are ready for development and their designs advance.

GOS.6 **Parcel D2 design.**

The Proponent continues to work through the public Design and Site Plan Review process for D2 as required by zoning. Other Blocks will go through Design and Site Plan Review once they are ready for development and their designs advance. Section 1.2.2 'Civic Spaces' provides additional information about the Proponent's evaluation of alternative D2 open space locations and underground parking as well as the Proponent's efforts to increase the size of and improve the quality of the D2 civic space/open space in response to community feedback.

Secretary Matthew Beaton
Executive Office of Energy & Environmental Affairs
Attn. MEPA Office
100 Cambridge Street Suite 900
Boston, MA 02114

Dear Secretary Beaton,

Please find below my request that you deny the waiver request (EEA#15889) for Phase One of the Union Square (Somerville) Redevelopment.

Response to MEPA Phase One Waiver Request EEA No. 15889

Development according to Union Square Station Associates will mean: a nightmare of rush-hour traffic jams, main streets choked beyond capacity, neighborhood side streets unsafe for anything but a steady stream of automobiles trying to avoid gridlock at key intersections, almost 1000 cars going around and around in circles looking for parking spaces, flooding, sharply increased noise levels and air pollution, and, close to 5000 workers seeking housing in Somerville adding to the already-astronomical housing pressures.

This is what Union Square Station Associates admits to in their request for a waiver on Phase One of their $1 billion, 15 acre, 2.4 million square foot development. The actual impacts will be much worse. They admit that MEPA Thresholds have been met on the Phase One site for transportation, waste water service, and soil contamination. US2 suggests solutions for some of these impacts, but for most they throw up their hands, saying that there is no solution, or that it's a regional problem that calls for a regional solution…without suggesting how they can contribute to the regional solution. The solutions that they do suggest will require the expenditure of millions of dollars, but they say little about how much money and who pays.

US2's development plans for the Union Square Revitalization Area, as documented in all agreements with the city of Somerville, the Somerville Redevelopment Authority, and the Somerville Planning Board, are three times the size of the area in Phase One submitted for review to MEPA. The three phases are planned to follow in close proximity to one another, over a period of at least twenty years. By submitting for approval, one phase at a time, and asking for a waiver, US2 is engaging in a not-to-vailed attempt to minimize the full environmental impact of their plans.

US2's own consultants, by throwing up their hands saying that there are no solutions for some of the problems, or casting them as requiring regional solutions, have made a case for why this development should not be built according to the current plan. At the same time, by requesting a waiver, US2 is trying to avoid examining the range and extent of environmental impacts created by a genuine reduced-density alternative plan as required by a full environmental review.

In a full environmental review the developer would probably be required to examine an alternative plan for development that is at least 20-30% less dense than the current proposal. The Somerville Board of Aldermen, Somerville Redevelopment Authority, and the Somerville Planning Board need to see what such an alternative looks like so that they can evaluate the tradeoffs for a more dense vs. a less dense development. If even the less dense plan is environmentally unsound, then further reductions might be made. US2 must add to, correct, and improve on their data, methodology, analysis, and conclusions in the various environmental impact areas as detailed further in this letter.

But first, it is important to address the contentions that US2 and its consultants have made to argue for a determination of waiver appropriateness. The first of these claims is undue hardship. The applicant has not documented the original timetable for construction and the revised timetable resulting from said delays as a result of regulatory or other causes. And, the applicant has not submitted any alternative solutions to this altered timetable, such as possible expedited construction times as a result of favorable contractor and construction trade agreements. The public and the Secretary are expected to take the developer's word for it without any evidence.

The second of these claims is that the potential environmental impacts of Phase One alone, are insignificant. There is a lot of evidence presented to support this claim. But, all of it pales in the face of inadequate, incomplete, and incorrect examination of these impacts. And, when consultants throw up their hands on traffic impacts or talk about regional solutions without describing how this development takes responsibility for the part of the regional problem that they are contributing to, then you can't say that impacts are insignificant.

Ample and unconstrained infrastructure facilities and services do not exist to support Phase One. Many of these facilities and services are only in the planning stages, or under construction as of this date. Examples include the Nunziato Field storm water storage project and the separation of storm water and sewage systems on Washington Street and Somerville Avenue.

The project is not severable. There are many elements of phase two and three that fill out commitments made by the developer as to the overall conformance with Somervision, the Neighborhood Plan and the CDSP. If phase two and phase three are not built, Phase One's environmental impacts would not be fully mitigated.

Lastly, it is hard to imagine a set of conditions that can address all the shortcomings of this filing so that it ensures due compliance with MEPA and 301 CMR11.00 prior to commencement of any other phase of the project.

Alternative development options – a lower density alternative

On the one hand the applicant represents that their lower density plan is The Neighborhood Plan. Then, it represents that the lower density plan just replaces a hotel with a life sciences building. Which is it? And to characterize The Neighborhood Plan as one that has the full community support is untrue. In either case, there is an assumption that all the applicant has to do is subtract some square footage and then said plan can be used to measure the lesser environmental impact. This is not true. A real lower density alternative would reveal how different mix of uses, lower square footage, and different design layouts alter the benefits and problems to the environment. A real lower density alternative would be 20-30% less dense than the current US2 plan. BC.1

Mitigation - Unanswered questions and insufficient responses to environmental conditions & impacts

Transportation and Traffic

When the highly-touted rerouting of two way traffic on Webster and Prospect Streets was implemented this past year traffic backups multiplied many fold, creating many more E and F rated intersections in and around Union Square. These are not reflected in the applicant's traffic counts and resulting calculations as they refer to anticipated air quality. Yes, the exclusive bus and bike lanes improved those modes. But, the claim that auto trips diminished is belied by the fact that the next alternative route over the railroad tracks to the east, on Warren Street in Cambridge, experienced a heavy increase in traffic by BC.2

autos trying to avoid the new backups. Did the applicant measure this increase? The answer is NO. It was not one of the 30 + intersections that were measured. So, we don't know whether anyone got out of their cars or took another route. There was also a marked increase in short turning lanes, further aggravating congestion and delays on Webster and Prospect.

Because so many intersections are already failing without the addition of 1000 US2 development cars, it is imperative that the developer do more than report annually on the effectiveness of their Mobility Management Plan. At a minimum, it should give up-to-date reports every six months. There should be a continuous monitoring with in-street car count strips at critical locations. While the shared parking, bicycle parking opportunities, separating parking spaces from leases, and incentives for transit use are steps in the right direction, there are too many places where the language is not proactive enough. Examples include:- transit passes "encouraged"; when reach a "certain level" then act to mitigate; and, "may be able" to make bulk purchases of passes (for bikes and transit), so as to provide them free to residents. What are the thresholds that trigger such actions? BC.3

The air pollution numbers don't factor in construction vehicle effects on congestion and air quality. There's mention that construction workers arrival times are off peak in the morning...only partially true. They fail to mention the afternoon peak, which begins at 3 PM, leaving time for many construction workers. BC.4

Infrastructure

The applicant talks about "increasing the city's resilience to weather events", but it can't stop the flooding that historically and regularly occurs on this site without the separation of storm and sewer pipes and the Nunziato Field storm water holding facility. BC.5

Soil Contamination

A lot has been said and written about soil contamination on all of the parcels making up Phase One land. In particular, the former Kiley Barrel site has been the subject of many cleaning operations and some environmental reviews. Has an adequate three dimensional study been done of the effects of flooding on the remaining soil contaminants and the close-to-the-surface water table? If not, shouldn't it be part of the Scope of a full EIR? What is it about the plan to cap some of the contaminants that might alter the possibility of alternative lower-density plans including underground parking as one of their elements? BC.6

Open Space and Sustainability

The applicant trumpets the provision of new quality, publically-accessible open space. But, it falls far short of the 30% called for in the Neighborhood Plan and Somervision. Not enough of the open space surfaces are permeable...let alone green. Without more green space, the heat island effect and flooding possibilities will continue to be a problem. And, US2 has chosen to place the major open space for Phase One smack up against the most polluted street bordering the whole Union Square Revitalization District....Prospect Street. How can it be considered quality space when particulates will be raining down on the people sitting there? BC.7

Affordable Housing and Jobs/Workforce Development

Most observers know that displacement has already begun as surrounding rents rise dramatically as landlords anticipate the arrival of the Green Line and associated new development. In order to address this in any substantial way a two-pronged approach needs to be immediately employed. More BC.8

affordable housing and opportunities for better-paying jobs have to be front-loaded in order to have the desired effect. Mitigation cannot be effectuated any other way. So, job linkage and housing linkage fees that are linked to square footage of commercial development already built do nothing to mitigate the pressures that displace residents in the Union Square area. The money comes too late, mostly after the third phase of development. This is another argument for why Phase One is not severable from the rest of the development for evaluating environmental impacts.

Small business relocation and displacement

Much of what makes Union Square unique and attractive to nearby residents and others alike is the diverse character of the businesses and services that are there now. Rising rents are pushing some of these establishments out. The applicant has no comprehensive solution to this trend. What would happen if the applicant offered space in the new development, at their current rent level, to any one of these aforementioned businesses that was displaced? BC.9

Environmental Impacts of Construction

As mentioned before, the traffic and air quality analysis doesn't take into consideration the emissions from construction workers commuting nor the emissions from construction equipment itself. It would be helpful to see more robust commitment to address the effects of this equipment idling. That is, instead of "No Idling" signs, how about banning idling? Instead of saying that turning off idling equipment is "expected", say it will be required. Instead of encouraging the use of low-sulfur fuels, how about requiring it? In addition, there are no specific plans for construction worker parking and only a promise to evaluate whether to commit to the Massachusetts Clear Air Construction Initiative. BC.10 BC.11

Description of the Site

The waiver request does not show evidence of site control. The city still owns much of the land designated for Phase One. And, many of the parcels in phases two and three are not under US2's control. The description of the entire development area is misleadingly negative. Except for the bulk of the Phase One site, which is almost entirely vacant, there are viable, well-maintained retail, commercial and light industrial spaces. One would expect that this realization should change how the applicant approaches all aspects of mitigation. This factor alone suggests that the applicant is not in a legitimate position to be granted a waiver for Phase One.

I hope that all of the above questions, observations and contentions have made a case for a denial of #EEA 15889, the request for a waiver on Phase One of the Union Square Redevelopment. Thank you for your patience in reviewing my request.

Sincerely,

Bill Cavellini, Co-Chair
Union Square Neighborhood Council
33 Oak Street
Somerville, MA 02143

BC.1 **Alternatives.**

Chapter 2 of the DEIR includes a discussion of alternatives, including a reduced build alternative.

BC.2 **Webster and Prospect Streets.**

Traffic, pedestrian and bicycle counts at all intersections were taken after the two-way conversion, and are incorporated in all the analyses included in the DEIR.

BC.3 **Traffic monitoring.**

Mobility Management Plan (MMP) requirements are set by the City of Somerville and are a condition of the Coordinated Development Special Permit. Individual MMPs for each Block will be completed with the Design Site Plan Review.

BC.4 **Construction related air pollution.**

Construction-related traffic will occur prior to the completion of the Project and will not be consistent throughout the construction period, and therefore modeling impacts would not provide reliable information. The Construction Management Plans (CMPs) that will be developed for each Block will include measures to reduce vehicle trips and include measures to mitigate air quality impacts to the extent practicable.

BC.5 **Infrastructure to prevent flooding.**

Chapter 9 of the DEIR provides information about existing and proposed storm drain infrastructure, as well as stormwater management. In addition, Section 10.1.3 includes information regarding infiltration and inflow mitigation. Section 1.1.2, Streetscape and Infrastructure Improvements, also includes additional details about the City's expansion of neighborhood stormwater infrastructure and the Project's contributions to that effort.

BC.6 **Contaminated soil.**

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

BC.7 **Open space.**

The Union Square Overlay District Zoning was adopted to codify the Neighborhood Plan targets and requires the Proponent to create more open space and public realm (25%) than what was recommended by the Neighborhood Plan (15%). As part of the

open space and public realm improvements, the approved plan will deliver over 2.5 acres of new, public civic spaces (see Section 1.2.2, Civic Spaces for an overview). Section 6.6.1 also describes how the new civic spaces will incorporate landscape, add permeable hardscape and add to the urban tree canopy to combat climate change effects and improve neighborhood livability

The Project will include a number of additional low impact development (LID) measures, where feasible and practicable. Residential buildings are anticipated to incorporate both blue and green roof technology to temporarily store stormwater, combined with rain water harvesting for irrigation. Permeable pavement will be substituted for traditional asphalt pavement in areas to promote infiltration and groundwater recharge.

BC.8 Affordable housing.

The intent of the Project is to provide a mix of uses consistent with an employment center, and includes housing to allow workers to live near their places of employment.

In regard to affordable housing, approximately 200 permanently affordable housing units on-site, a portion of which will be included in D2 which includes the first residential building anticipated to be constructed, in addition to the approximately $10.9 million in housing linkage funds to support additional affordable housing in the City.

BC.9 Space for displaced businesses.

Existing businesses that are located on redevelopment parcels will be provided relocation assistance in accordance with the Commonwealth-approved Union Square Revitalization Plan and Massachusetts General Laws Chapter 79A and Regulations at 760 CMR 27.00 et seq. as individual parcels are acquired.

For the eight existing businesses located on redevelopment parcels that have uses that are consistent with the vision for Union Square outlined in the Union Square Neighborhood Plan and are permitted uses in the Union Square Overlay District zoning, the Proponent will offer these businesses an opportunity to remain in Union Square and will work with these businesses to identify space for their business within the redevelopment.

BC.10 Construction impacts.

Chapter 12 of the DEIR includes information about construction impacts and the CMPs that will be required.

The transportation analysis in the DEIR is reflective of the full build condition of the Project. Construction-related traffic will occur prior to the completion of the Project and will not be consistent throughout the construction period. The CMPs that will be developed for each Block will include measures to reduce vehicle trips and promote alternative modes of transportation. In addition, construction trucks that will be delivering materials or taking materials from the Project site will be required to follow truck routes and obey rules that will be incorporated into the CMPs.

BC.11 No idling.

All construction trucks will be required to comply with the Massachusetts anti-idling regulations. It is likely that the Proponent will use a contractor that uses these pollution controls on their fleet of heavy construction equipment, and the Proponent will strongly encourage the contractor to utilize heavy equipment with pollution controls on the Project. During the development of Project CMPs, the Proponent will request from the contractor a certified list of the non-road diesel-powered construction equipment that includes emission control devices.

August 23, 2018

Matthew Beaton, Secretary

Executive Office of Energy and Environmental Affairs
Attn: MEPA Office / MEPA Analyst Alex Strysky
100 Cambridge Street, Suite 900
Boston MA 02114

Via email to Mr. Alex Strysky

RE: **EEA#15889, ENF, Union Square Redevelopment, Somerville MA**

Dear Secretary Beacon

My name is Tori Antonino, I live on Prospect Hill right outside Union Square. I have been engaging in this development process for several years. I am an environmental advocate and am committed to creating a healthy sustainable Union Square.

After attending the MEPA information session on August 2 and reviewing the proponent's application, my determination is that the proponent US2 not be granted the waiver and here's why.

Public Process

While going over the document I was struck at how exhaustive the public process appears to have been. It has been long and people are frustrated, but it has failed to produce a design that reflect the values that came of these years long process. We ordained documents and wrote policy on having a healthy, equitable, environmentally sustainable, activated urban transit center have a public realm that invites, excites and stays true to our goals of SOMERVISION goals of connectivity, sense of place and a prioritization of people.

If ordained documents of community values and years long process fail to create what we envisioned then it means the process is not done and the proposal is not satisfactory.

Phase 1 design

What is not in US2's proposal is how vocally critical and unsatisfied the majority of the community is towards this Phase 1 design. The public realm is in an unhealthy location. There is no sense of place. TA.1
There are no sightlines that identify where you are save for the 24 story tower that greets you on arrival. There is a behemoth of a three story above ground parking garage looming over residential neighborhoods. Where the need for residents to access green and open spaces is essential for physical and mental health and where environmental justice and valuing open spaces have been historically absent throughout Somerville's development, US2 has delineated the largest green and open space on the D2 parcel to be a private amenity space for residents in the tower. It occupies the entire roof of the parking garage.

Traffic impacts and residents' health

I am also concerned that the traffic impacts have not adequately been studied. I worry about TA.2
increasing people's exposure to particulate matter by putting the main civic space adjacent to Prospect TA.3
Street. The error US2 made in their application stating that 22 Bennet Street had been part of the toxic TA.4
Kylie Barrel site remediation of 2013 makes me certain the proponents are unconcerned about the health of people here.

US2 has passed the EIR threshold in trips generated and parking. This alone should be enough to deny a waiver, but I'll try to put a finer point on it. As the current design shows the largest chunk of civic TA.5
space will be adjacent to least five hours of bumper to bumper weekday traffic. This is before anything is built, before the +4,992 (unadjusted) new trips predicted for phase 1 are generated.

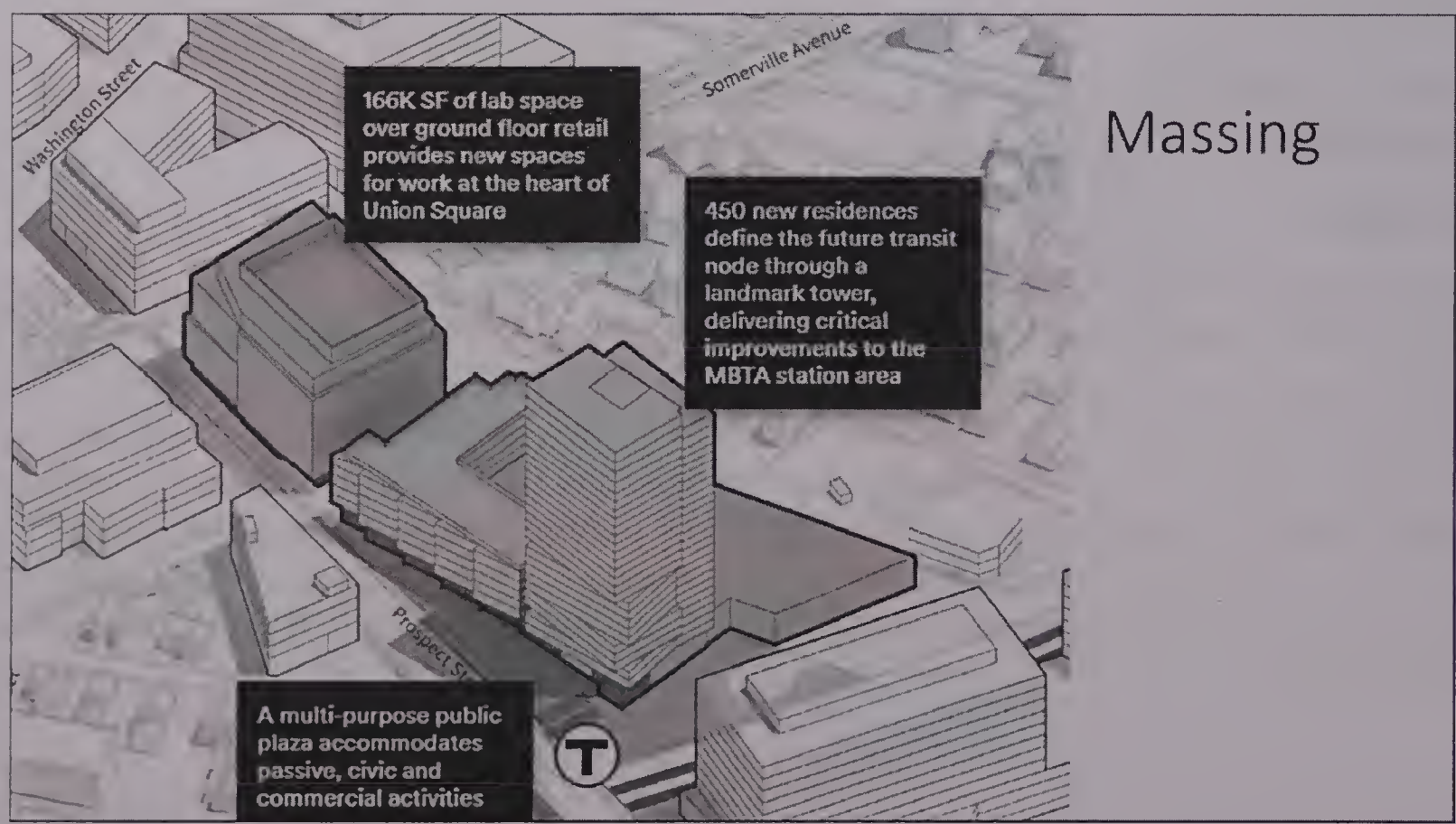
That means the plaza and the people encouraged to be there will be blanketed with pollution and particulate matter throughout the day. Although regulations may have yet to catch up, the science on particulate matter is in. These ultra-fine particles wreak havoc with people's health causing asthma, cancer, cardiovascular illness, autism and other illnesses.

More immediately, it means the air will be heavy with exhaust. It will be hot, noisy and without shade. This is not the experience we want for those who come to Union Square. The public realm gives a place its identity. I want people to remember Somerville for its green, healthy and vibrant civic space not for its gray polluted one that poses a health risk to the people who use them.

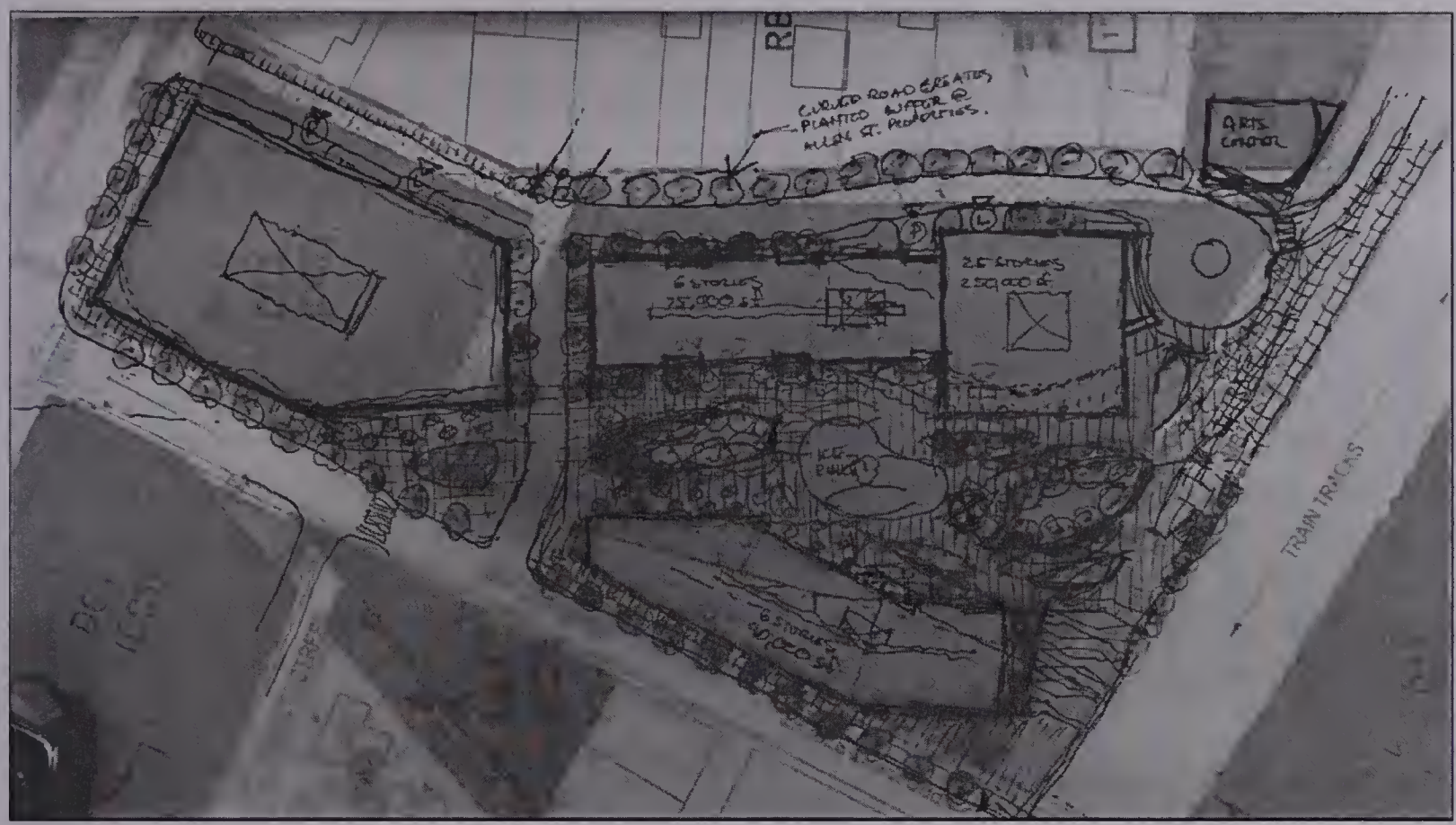
I would like to see US2 investigate the health impacts of the particulate matter generated in this plaza. TA.6

Since the public realm will guide our pathways throughout the day, we need to build them with the health of the people in mind first.

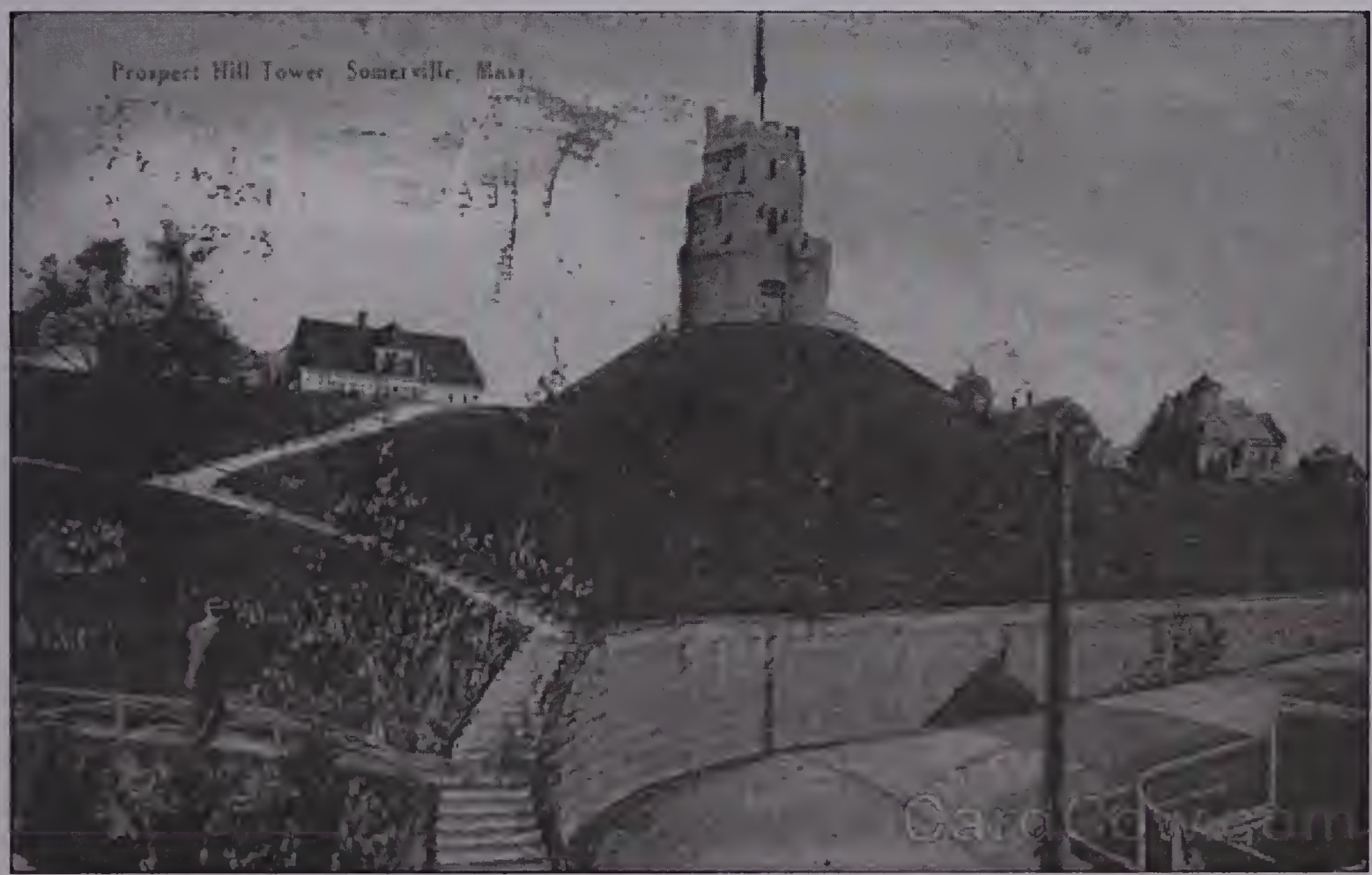
Below is the US2 design proposal with the plaza bordered by Prospect Street and the train tracks.



Here is a concept of what I would like Union Square Station to look more like:



The plaza is protected by the buildings. When you get off the train there is an immediate sight line to the Prospect Hill Monument and the Old Post Office.



This design came out of a recent community design charrette, where 3 teams of architects, planners and visioners were given different challenges to come up with a better design. The one shown has a single layer of underground parking across the D2.2 parcel and was created by Tim, Talun and Anne Tate.

Slideshow presentation:

http://unionsquareneighborhoodcouncil.org/images/docs/180813-D2%20Site%20Design%20Alternatives.pdf

I share all this work with you because I am a passionate resident, one of many, who is determined to get this project right. We ask that the secretary not grant this waiver. We need as much oversight and assistance from outside agencies as possible. We want to build a square that is healthy, sustainable, equitable. We look forward to working with MEPA, the developer, the MBTA and the city to taking steps to make this possible.

Thank you for your attention,

Tori Antonino

Boston Street, Somerville

TA.1 **D2 design.**

The Proponent has been refining the D2 design based on community feedback throughout the Design and Site Plan Review process required by zoning.

TA.2 **Traffic impacts.**

Chapter 4 of the DEIR includes a Transportation Impact Assessment for the Project.

TA.3 **Proposed main civic space location.**

In direct response to these community comments, the Proponent has improved the D2 design by increasing the size of the plaza by 25% and has also added a new publicly-accessible green space of approximately 3,000 sf on D2 near the MBTA station platform. In addition, the plaza has been widened to create greater horizontal separation from Prospect Street vehicles. The elevation of the plaza has also been set at approximately the same elevation as the adjacent Union Square Station allowing the southern 150 feet of the plaza to benefit from being approximately seven vertical feet below Prospect Street. The largest portion of the plaza, where people are most inclined to congregate, is at the southern end of D2 and benefits from the most vertical separation from Prospect Street (approximately 10 to 14 vertical feet). A vegetated landscape buffer has also been planned between the Prospect Street sidewalk and the main pedestrian areas of the plaza to further separate main pedestrian areas on the plaza from the vehicles.

TA.4 **Contaminated soil on the Kylie Barrel site.**

Chapter 8 of the DEIR includes a discussion of site conditions on all of the Blocks, including 22 Bennet Street, as well as the anticipated plans to bring the sites to a level of No Significant Risk.

TA.5 **D2 Civic Space.**

In direct response to these community comments, the Proponent has improved the D2 design by increasing the size of the plaza by 25% and has also added a new publicly-accessible green space of approximately 3,000 sf on D2 near the MBTA station platform. In addition, the plaza has been widened to create greater horizontal separation from Prospect Street vehicles. The elevation of the plaza has also been set at approximately the same elevation as the adjacent Union Square Station allowing the southern 150 feet of the plaza to benefit from being approximately seven vertical feet below Prospect Street. The largest portion of the plaza, where people are most inclined to congregate, is at the southern end of D2 and benefits from the most vertical separation from Prospect Street (approximately 10 to 14 vertical feet). A vegetated

landscape buffer has also been planned between the Prospect Street sidewalk and the main pedestrian areas of the plaza to further separate main pedestrian areas on the plaza from the vehicles.

TA.6 **Particulate matter generated by plaza.**

As mentioned above, the Proponent has made changes to the Plaza in response to community concerns. The Proponent is aware of the concern regarding ultrafine particles, and continues to evaluate measures to minimize the impact of vehicle-related pollutants on users of the Project site, including designing horizontal and vertical separation between the D2 civic space and vehicles as well as the strategic placement of vegetation.

August 23, 2018
Matthew Beaton, Secretary
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office / MEPA Analyst Alex Strysky
100 Cambridge Street, Suite 900
Boston MA 02114

Via email to Mr. Alex Strysky
RE: EEA#15889, ENF, Union Square Redevelopment, Somerville MA

Dear Secretary Beaton,

I'm writing express my objection to the granting of a Phase 1 waiver to the proponents, with particular emphasis on the unanalyzed impacts of particulate matter on pedestrians and congregants in the proposed 'Plaza' that abuts Prospect Street.

This public space is designed in such a way to attract congregant and users, and encourage them to linger. Unfortunately, it also abuts a gridlocked thoroughfare—Prospect Street—that runs in 2 directions. This street is already graded an "F" for traffic, and will only get worse with the increased usage from the development. This effectively what the law calls an "attractive nuisance". It lures people to a newly created plaza where they will have the opportunity to suck down carcinogenic nanoparticles is creating a **new public health hazard** where there currently is none. JK.1

This is particularly galling given the fact that the Green Line is only coming to Somerville because of a lawsuit about mitigating pollution from I-93, which cuts through the East part of our city. Now, new risks to public health are being introduced by luring people to an area of heightened local pollution.

Solutions to this have been proposed. All three alternatives proposed by our Neighborhood Council's Design Committee place the Plaza behind a built structure, in an area enclosed by buildings. This design would shield recreants from the harmful plumes of nanoparticles, and make it a much safer and enjoyable place to congregate.

I urge MEPA to not grant the waiver, and direct the proponents to investigate and pursue a design that does not attract the public to a hazardous pollutant-filled plaza. This is essential mitigation that the proponents have not addressed, and it should be disqualifying.

Sincerely,

Jacob Kramer
8 Quincy St. Somerville, MA 02143
Board Member of the Union Square Neighborhood Council

JK.1 **Public space design.**

In direct response to these community comments, the Proponent has improved the D2 design by increasing the size of the plaza by 25% and has also added a new publicly-accessible green space of approximately 3,000 sf on D2 near the MBTA station platform. In addition, the plaza has been widened to create greater horizontal separation from Prospect Street vehicles. The elevation of the plaza has also been set at approximately the same elevation as the adjacent Union Square Station allowing the southern 150 feet of the plaza to benefit from being approximately seven vertical feet below Prospect Street. The largest portion of the plaza, where people are most inclined to congregate, is at the southern end of D2 and benefits from the most vertical separation from Prospect Street (approximately 10 to 14 vertical feet). A vegetated landscape buffer has also been planned between the Prospect Street sidewalk and the main pedestrian areas of the plaza to further separate main pedestrian areas on the plaza from the vehicles.

Wig Zamore
13 Highland Avenue #3
Somerville MA 02143
617-625-5630
wigzamore@gmail.com

August 23, 2018

Matthew Beaton, Secretary
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office / MEPA Analyst Alex Strysky
100 Cambridge Street, Suite 900
Boston MA 02114

Via email to Mr. Alex Strysky to alexander.strysky@mass.gov

RE: **EEA#15889, Expanded ENF with Phase 1 Waiver Request, Union Square Redevelopment, Somerville MA**

Dear Secretary Beaton,

I am writing with a request that you deny the Phase 1 Waiver for the Union Square Re-development (#15889) but with great longer term enthusiasm for this new era of Union Square evolution. The D2 Block lies between the new GLX T-Stop, re-development potential in almost all directions and environmental justice neighborhoods to the East and Northeast. **It is THE keystone block.**

D2 is the single most important block to be developed not only in this particular 2.4 million square foot mixed use development proposed by US2 and the SRA, but also the single block in all of Union Square that is least separable from our exciting and evolving urban mixed use center. It is inseparable from the rest of the D Block re-developments and their more sustainable future.

The new Union Square GLX T-Stop being developed by the MBTA adjacent to D2 is the largest Massachusetts investment in a light rail spur and single station in over 60 years. This new electric transit facility, fought for by residents, businesses and local leaders for the last two decades, must serve daily visitors and residents in all directions if we are to build a more resilient Somerville.

Currently, the planned path of travel to the T-Stop from the heart of Union Square at the intersection of Washington Street, Somerville Avenue and Prospect Street lies in the middle of the most traffic polluted portion of Union Square. The planned path of travel from the heart of Union Square also has many steps, and will not allow mobility challenged T users to share the same route.

The proposed D2 path to the T-Stop, shown as a retail intense area adjacent to Prospect Street, will not be a great place to hang out. Traffic levels are expected to increase with development of the D Blocks and there will be increases in pollution intensity brought on by the canyon effect of higher buildings and greater street wall frontage on these most congested streets of Union Square.

Tufts University, the Somerville Transportation Equity Partnership and the City of Somerville have worked together on some of the most advanced environmental epidemiology studies of traffic pollution and cardiovascular biomarkers of risk, such as C Reactive Protein and Interleukin 6. We have shown in those areas of Somerville studied most intensely that there is a significant relationship between traffic ultrafine particulate exposure (UFP PNC) and these health risks. Our studies have been funded by US NIH, US HUD and US EPA, as well as the Kresge Foundation.

I would be happy to make available to you a dozen or two of our "CAFEH" studies upon request.

Other things being equal, those who live within 50 to 100 meters of very busy roadways in advanced economies should expect to incur 50% or more increased risk of annual cardiovascular and lung cancer mortalities, and similar increases in incidence of childhood asthma and autism.

I am attaching several excellent whole city environmental epidemiology studies from Stockholm, Copenhagen and Vancouver showing these increased traffic pollution mortality risks, and studies from California showing the increased risks of childhood asthma and autism spectrum disorders. Note that all but the ASD studies are well-established, while the ASD literature is still evolving.

Furthermore, the future D2 Block also hosts the most intense known but unresolved ground pollution in Union Square, with 17 recorded sites of concern to Mass DEP and US EPA. The EENF has a mere page and a half of text very vaguely describing the number of polluted sites of concern, and containing little information on recent testing of the D2 Block, or future mitigation strategies. WZ.1

I fervently hope that the development of the D Blocks will be everything that Somerville citizens could hope for, and also robustly profitable for the project proponents. Improved long term live work balance is critical to Somerville's future. I am a firm supporter of Somerville's Comprehensive Plan, SomerVision, and its balanced goals of 6000 new housing units, 20% affordable, 30,000 new jobs, and 125 new acres of green and open space, accompanied by more sustainable clean transit, and active transport in the form of better walking and biking facilities.

Thank you for considering these comments.

Most Respectfully, Wig Zamore

Environmental Health Perspectives doi:10.1289/ehp.1408698

Supplemental Material

A Study of the Combined Effects of Physical Activity and Air Pollution on Mortality in Elderly Urban Residents: The Danish Diet, Cancer, and Health Cohort

Zorana Jovanovic Andersen, Audrey de Nazelle, Michelle Ann Mendez, Judith Garcia-Aymerich, Ole Hertel, Anne Tjønneland, Kim Overvad, Ole Raaschou-Nielsen, and Mark J. Nieuwenhuijsen

AirGIS Human Exposure Modelling System

AirGIS (Jensen et al. 2001) is based on a geographical information system (GIS) and used for estimating traffic-related air pollution and has high temporal (an hour) and spatial (individual address) resolution. AirGIS (see: http://AirGIS.dmu.dk) calculates air pollution at a location as the sum of three contributors: (1) local air pollution from street traffic, calculated with the Operational Street Pollution Model (Berkowicz R 2000) (OSPM) from data on traffic (intensity and type), emission factors for each vehicle type and EURO class, street and building geometry, and meteorology; (2) urban background, calculated from a simplified urban background (SUB) procedure (Berkowicz et al. 2008) that takes into account urban vehicle emission density, city dimensions (transport distance), and average building height (initial dispersion height); and (3) regional background, estimated from trends at rural monitoring stations and from national vehicle emissions (Jensen SS 1998). Input data for the AirGIS system come from various sources: a GIS-based national street and traffic database, including construction year and traffic data for the period 1960–2005, (Jensen SS et al. 2009a) and a database on emission factors for the Danish car fleet (Berkowicz R et al. 2006; Ketzel M et al. 2007), with data on light- and heavy-duty vehicles dating back to 1960, built and entered into the emission module of the OSPM. A national GIS database with building footprints supplemented with construction year and building height from the national building and dwelling register, national survey and cadastre data-bases, and a national terrain-evaluation model, provided the correct street geometry for a given year at a given address. With a geocoded address and a year, the starting point is specified in place and time, and the AirGIS system automatically generates street configuration data for the OSPM, including street orientation, street width, building heights in wind sectors, traffic intensity and type, and the other data required for the model. Air pollution is calculated in

2m height at the façade of the building. The AirGIS system has been successfully validated (Berkowicz R 2008; Raaschou-Nielsen O et al. 2000) and used in a number of studies, few early examples listed here (Jensen SS et al. 2009b; Hertel O et al. 2001; Hertel O. et el. 2008).

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Table S1. Adjusted associations[a] of total and cause-specific mortality with cycling among 52,061 participants in Diet, Cancer and Health cohort, by intensity of cycling and different levels of NO_2.

Physical Activity	Low NO_2 (< 15.1 µg/m^3) HR (95% CI	Moderate NO_2 (15.1-23.9 µg/m^3) HR (95% CI	Very high NO_2 (≥ 23.9 µg/m^3) HR (95% CI	*p-value*[b]
Total mortality (*n* = 5,534)				
Does not cycle	1.00	1.26 (1.15, 1.39)	1.39 (1.22, 1.58)	
Cycles 0.5-4 h/week	0.87 (0.79, 0.95)	1.00 (0.91, 1.10)	1.10 (0.96, 1.26)	
Cycles >4 h/week	0.82 (0.72, 0.93)	1.02 (0.92, 1.14)	1.19 (1.01, 1.40)	*0.52*
Cancer mortality (*n* = 2,864)				
Does not cycle	1.00	1.22 (1.07, 1.39)	1.36 (1.13, 1.64)	
Cycles 0.5-4 h/week	0.97 (0.86, 1.10)	1.09 (0.96, 1.23)	1.19 (0.98, 1.45)	
Cycles >4 h/week	0.91 (0.76, 1.08)	1.14 (0.99, 1.33)	1.16 (0.92, 1.47)	*0.71*
Cardiovascular mortality (*n* = 1,285)				
Does not cycle	1.00	1.36 (1.13, 1.64)	1.78 (1.39, 2.29)	
Cycles 0.5-4 h/week	0.83 (0.68, 1.01)	1.09 (0.90, 1.31)	1.21 (0.91, 1.61)	
Cycles >4 h/week	0.73 (0.55, 0.96)	0.98 (0.78, 1.23)	1.38 (1.00, 1.91)	*0.78*
Respiratory mortality (*n* = 354)				
Does not cycle	1.00	1.02 (0.74, 1.40)	0.73 (0.45, 1.18)	
Cycles 0.5-2 h/week	0.56 (0.39, 0.81)	0.72 (0.51, 1.02)	0.48 (0.26, 0.89)	
Cycles >4 h/week	0.49 (0.28, 0.85)	0.57 (0.37, 0.88)	0.57 (0.29, 1.12)	*0.78*
Diabetes mortality (*n* = 122)				
Does not cycle	1.00	1.36 (0.79, 2.37)	1.20 (0.56, 2.53)	
Cycles 0.5-2 h/week	0.69 (0.35, 1.34)	0.86 (0.46, 1.61)	0.69 (0.25, 1.84)	
Cycles >4 h/week	0.55 (0.21, 1.47)	0.75 (0.36, 1.56)	0.56 (0.16, 1.91)	*0.98*

HR hazard ratio; CI confidence interval.

[a]Adjusted for NO_2, gender, calendar year, and mutually for other three physical activities, occupational physical activity, smoking status, smoking intensity, smoking duration, alcohol intake, environmental tobacco smoke, education, fruit and vegetable intake, fat intake, risk occupation, mean income in municipality, and stratified by marital status. [b]*p*-value for interaction.

Table S2. Adjusted Associations[a] of total and respiratory with different types of physical activities in 52,061 participants in Diet, Cancer and Health cohort with definition of high NO_2 above 90th percentile (23.9 μg/m^3).

Physical Activity	Main Model Fully Adjusted HR (95% CI)	Interaction Model Moderate/Low NO_2 (< 23.9 μg/m^3) HR (95% CI)	Interaction Model High NO_2 (≥ 23.9 μg/m^3) HR (95% CI)	*p-value*[b]
Total natural mortality (*n* = 5,534)				
Sports	0.78 (0.73, 0.82)	0.78 (0.74, 0.83)	0.74 (0.63, 0.87)	*0.38*
Cycling	0.83 (0.78, 0.88)	0.84 (0.79, 0. 88)	0.81 (0.71, 0.93)	*0.48*
Gardening	0.84 (0.79, 0.89)	0.86 (0.80, 0.92)	0.78 (0.72, 0.91)	*0.79*
Walking	0.96 (0.88, 1.06)	0.96 (0.87, 1.07)	0.95 (0.72, 1.27)	*0.85*
Respiratory mortality (*n* = 354)				
Sports	0.60 (0.47, 0.77)	0.62 (0.47, 0.80)	0.57 (0.28, 1.18)	*0.98*
Cycling	0.62 (0.50, 0.77)	0.61 (0.48, 0.77)	0.74 (0.39, 1.38)	*0.62*
Gardening	0.63 (0.50, 0.79)	0.61 (0.48, 0.78)	0.79 (0.42, 1.51)	*0.35*
Walking	0.71 (0.51, 0.97)	0.73 (0.52, 1.02)	0.67 (0.24, 1.83)	*0.65*

HR hazard ratio; CI confidence interval.

[a]Adjusted for NO_2, gender, calendar year, and mutually for other three physical activities, occupational physical activity, smoking status, smoking intensity, smoking duration, alcohol intake, environmental tobacco smoke, education, fruit and vegetable intake, fat intake, risk occupation, mean income in municipality, and stratified by marital status. p[b]*p*-value for interaction.

Table S3. Adjusted associations[a] of total and respiratory mortality with different types of physical activities in 13,948 participants in Diet, Cancer and Health cohort who lived in inner Copenhagen (Frederiksberg and Copenhagen municipalities, with 75th percentile of NO_2 of 24.0 μg /m^3).

Physical Activity	Main Model Fully Adjusted[b] HR (95% CI)	Interaction Model Moderate/Low NO_2 (< 24.0 μg/m^3) HR (95% CI)	Interaction Model High NO_2 (≥ 24.0 μg/m^3) HR (95% CI)	*p-value*[b]
Total natural mortality (*n* = 2,053)				
Sports	0.77 (0.70, 0.85)	0.79 (0.70, 0.88)	0.75 (0.62, 0.90)	*0.67*
Cycling	0.86 (0.78, 0.94)	0.88 (0.79, 0.99)	0.82 (0.69, 0.97)	*0.40*
Gardening	0.84 (0.76, 0.92)	0.86 (0.77, 0.95)	0.79 (0.66, 0.94)	*0.51*
Walking	0.90 (0.77, 1.06)	0.89 (0.74, 1.08)	0.90 (0.65, 1.27)	*0.81*
Respiratory mortality (*n* = 163)				
Sports	0.52 (0.36, 0.77)	0.58 (0.38, 0.88)	0.41 (0.16, 1.05)	*0.57*
Cycling	0.74 (0.54, 1.02)	0.73 (0.51, 1.04)	0.84 (0.40, 1.76)	*0.72*
Gardening	0.66 (0.47, 0.93)	0.68 (0.46, 0.99)	0.71 (0.32, 1.55)	*0.95*
Walking	0.77 (0.45, 1.29)	0.88 (0.48, 1.61)	0.49 (0.16, 1.52)	*0.36*

HR hazard ratio; CI confidence interval.

[a]Adjusted for NO_2, gender, calendar year, and mutually for other three physical activities, occupational physical activity, smoking status, smoking intensity, smoking duration, alcohol intake, environmental tobacco smoke, education, fruit and vegetable intake, fat intake, risk occupation, mean income in municipality, and stratified by marital status. [b]*p*-value for interaction.

Changes in Residential Proximity to Road Traffic and the Risk of Death From Coronary Heart Disease

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Background: Residential proximity to road traffic is associated with increased coronary heart disease (CHD) morbidity and mortality. It is unknown, however, whether changes in residential proximity to traffic could alter the risk of CHD mortality.

Methods: We used a population-based cohort study with a 5-year exposure period and a 4-year follow-up period to explore the association between changes in residential proximity to road traffic and the risk of CHD mortality. The cohort comprised all residents aged 45–85 years who resided in metropolitan Vancouver during the exposure period and without known CHD at baseline (n = 450,283). Residential proximity to traffic was estimated using a geographic information system. CHD deaths during the follow-up period were identified using provincial death registration database. The data were analyzed using logistic regression.

Results: Compared with the subjects consistently living away from road traffic (>150 m from a highway or >50 m from a major road) during the 9-year study period, those consistently living close to traffic (≤150 m from a highway or ≤50 m from a major road) had the greatest risk of CHD mortality (relative risk [RR] = 1.29 [95% confidence interval = 1.18–1.41]). By comparison, those who moved closer to traffic during the exposure period had less increased risk than those who were consistently exposed (1.20 [1.00–1.43]), and those who moved away from traffic had even less increase in the risk (1.14 [0.95–1.37]). All analyses were adjusted for baseline age, sex, pre-existing comorbidities (diabetes, chronic obstructive pulmonary disease, hypertensive heart disease), and neighborhood socioeconomic status.

Conclusions: Living close to major roadways was associated with increased risk of coronary mortality, whereas moving away from major roadways was associated with decreased risk.

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A growing body of epidemiologic evidence has demonstrated that long-term exposure to ambient air pollution, especially fine particles, is associated with increased cardiovascular morbidity and mortality.[1,2] Several cohort studies suggest that coronary heart disease (CHD) is more strongly associated with fine particulate air pollution than are other cardiovascular outcomes.[3,4] In metropolitan areas, road traffic is a major contributor to air pollution.[5,6] A European study estimated that approximately half of the adult mortality from air pollution was attributed to traffic-related air pollution.[7] Because exposure to traffic-related air pollution is extensive worldwide, the corresponding adverse cardiovascular effects may represent an important public health problem.[1]

The concentrations of traffic-related air pollutants decrease exponentially from major roadways and typically approach background concentrations within about 150 meters.[6,8] The distances from residences to major roadways may therefore reflect spatial variability in the concentrations of traffic-related air pollutants. Although traffic proximity may also be associated with other exposures such as traffic noise, it can serve as a simple and policy-relevant surrogate for exposure to traffic-related air pollution.[9,10] This metric has been widely used in epidemiologic studies of the health effects of traffic-related air pollution.[9–19]

There have been a number of epidemiologic studies examining the associations between residential proximity to traffic and adverse cardiovascular outcomes including arterial atherosclerosis[11,12] and CHD morbidity and mortality.[13–19] Although most of these studies have reported associations, the findings are not entirely consistent. One critical limitation of these studies is the assumption that baseline residential exposure status is consistent during the entire follow-up period; residential relocation after baseline enrollment has generally been ignored. This unrealistic assumption may

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result in exposure misclassification, and thus bias effect estimates toward the null.

We conducted a large population-based cohort study with detailed residential history information to investigate the association between residential proximity to road traffic and the risk of CHD mortality. Specifically, we examined the following factors: (1) whether residential proximity to traffic was associated with higher levels of exposure to traffic-related air pollution; (2) whether living close to traffic was associated with an increased risk of CHD mortality; and (3) whether changing residences, and therefore changing proximity to traffic, was associated with an altered risk of CHD mortality.

METHODS

Study Design

This population-based cohort study was conducted in metropolitan Vancouver, Canada. We used linked administrative databases from British Columbia's universal health insurance system to assemble a population-based cohort (eAppendix, http://links.lww.com/EDE/A405). This study included 2 stages: a 5-year exposure period (January 1994–December 1998), and a 4-year follow-up period (January 1999–December 2002). Mortality information during the follow-up period was identified from the provincial death registration database. CHD mortality was compared between study subjects with different residential-traffic-exposure profiles to determine the relationship between residential proximity to road traffic and the risk of CHD mortality. This study was approved by the institutional review board of The University of British Columbia.

Study Cohort

All metropolitan Vancouver residents who met the following criteria at baseline (January 1999) were included in the cohort: (1) registered with the provincial health insurance plan, which provides universal coverage to the resident population; (2) age 45–85 years; and (3) without previous diagnosis of CHD. A small number (4%) of study subjects who moved to other regions of the province during the 5-year exposure period were included, all other subjects remained in the study region during the exposure period.

Residential Proximity to Road Traffic

We categorized residential proximity to traffic based on individual residential histories (eAppendix, http://links.lww.com/EDE/A405), and whether a 6-digit residential postal code (area centroid) was located within 50 m or 150 m of a highway or a major road during the 5-year exposure period and the 4-year follow-up period. The study subjects were divided into 4 groups:

1. Not exposed to traffic: consistently living away from traffic until the end of follow-up;
2. Consistent exposure to traffic: consistently living close to traffic until the end of follow-up;
3. Moved close to traffic: changing residence from nonexposed to exposed to traffic during the exposure period and retaining this exposure status until the end of follow-up;
4. Moved away from traffic: changing residence from exposed to nonexposed to traffic during the exposure period and retaining this nonexposure status until the end of follow-up.

Subjects with more than one change in exposure status during the exposure period were excluded; those who changed their exposure status during the follow-up period were also excluded.

Depending on road types (highway or major road) and distance from major roadways, residential proximity to traffic was divided into 5 categories: (1) ≤50 versus >50 m from a highway; (2) ≤150 versus >150 m from a highway; (3) ≤50 versus >50 m from a major road; (4) ≤150 versus >150 m from a major road; (5) ≤150 m from a highway or ≤50 m from a major road versus >150 m from a highway or >50 m from a major road. Subjects living within a specific distance were assigned to the exposure group, while the rest were assigned to the nonexposure group (eAppendix, http://links.lww.com/EDE/A405).

Traffic-related Air Pollution Assessment

We used high-resolution land-use regression models to evaluate exposure levels to traffic-related air pollutants. Because the air pollution measurements did not cover the whole study region, air pollution data were available only for a subgroup of the cohort.

Using detailed residential history and corresponding monthly concentrations of traffic-related air pollutants during the 5-year exposure period, average concentrations of air pollutants were calculated for each subject. Detailed methods for the measurement of air pollutants in this study have been described elsewhere.[20,21] A brief description of traffic-related air pollution assessment is available in the eAppendix (http://links.lww.com/EDE/A405).

Coronary Heart Disease Mortality

A case of CHD death was defined as a death record in the provincial death registration database with CHD (ICD-9 codes 410–414, 429.2 and ICD-10 codes I20–I25) as the cause of death. A small proportion of deaths were identified using provincial hospitalization records: a hospitalization death record with CHD as the principal diagnosis for a hospital admission.

Subjects who had a hospitalization record with CHD as the principal or primary diagnosis before baseline (on the basis of data available from January 1991 to December 1998) were regarded as previously-diagnosed CHD cases, and were excluded from the analysis.

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Pre-existing Comorbidities

Chronic obstructive pulmonary disease (COPD)[22] (ICD-9: 490, 491, 492, 496; ICD-10: J40–J44), diabetes[23] (ICD-9, 250; ICD-10, E10–E14), and hypertensive heart disease[23] (ICD-9: 401–404; ICD-10: I10–I14) are independent risk factors for CHD. In addition, these chronic diseases and CHD share common behavioral risk factors such as cigarette smoking. In an effort to control the influence of the pre-existing comorbidities and these common behavioral risk factors, all diagnoses (not restricted to principal or primary diagnosis) in a hospitalization record were used to identify subjects with these comorbidities. One hospitalization record with the diagnosis of any of these diseases during January 1991 to December 1998 was defined as the presence of pre-existing comorbidities.

Neighborhood Socioeconomic Status

Individual-level income data were not available in this study. We used neighborhood-income quintiles from the 2001 Statistics Canada Census data to approximate a subject's socioeconomic status (SES). Neighborhood-income quintiles were assigned to study subjects through their residential postal codes (eAppendix, http://links.lww.com/EDE/A405).

Statistical Analysis

We compared the baseline characteristics among the exposure groups using a χ^2 test for dichotomous variables, one-way analysis of variance (ANOVA) for continuous variables, and Tukey's post hoc analysis for pair-wise comparisons of continuous variables. Similarly, in a subgroup analysis for the subjects with air pollution data, we used ANOVA and Tukey's post hoc analysis to determine whether residential traffic-exposure profiles were associated with exposure levels to traffic-related air pollutants.

To determine the association between residential proximity to traffic (predictor variable) and the risk of CHD mortality (dependent variable), we first performed bivariable logistic regression analysis using the nonexposed group as the reference category. Then we performed multivariable logistic regression analysis to adjust for age (quintiles), sex, neighborhood income (quintiles), and pre-existing comorbidities including diabetes, COPD, or hypertensive heart disease (yes or no). These analyses were repeated for different combinations of road types (highway or major road) and distances (50 or 150 m).

To examine the influence of age and sex on the risk of CHD mortality associated with traffic exposure, we performed stratification analyses by age (<65 years, ≥65 years) and sex, using the exposure category ≤150 m from a highway or ≤50 m from a major road.

The exposure category "≤50 versus >50 m from a highway" had the largest effect estimates. We therefore used this category to perform a sensitivity analysis in which we compared the relative risks of CHD mortality using various distances from a highway and various frames of reference.

All analyses were performed using SAS 9.1 (SAS Institute Inc., Cary, NC).

RESULTS

We use the road traffic exposure category "≤150 m from a highway or ≤50 m from a major road versus >150 m from a highway or >50 m from a major road" to present the overall results of this study. At baseline in January 1999, there were 488,785 subjects who met the inclusion criteria. At the end of follow-up, 38,502 persons (8%) were lost to follow-up, mainly due to moving out of the province or dying from other diseases. This left 450,283 subjects with complete data; 210,128 persons (47%) changed their residences at least one time during the 9-year study period, and 68,726 persons (15%) changed their exposure status. We excluded 12,619 persons (3%) with multiple changes in exposure status and 22,871 (5%) who changed their exposure status during the follow-up period. This left 414,793 subjects for analysis: 328,609 (79%) who consistently lived away from traffic, 52,948 (13%) who consistently lived close to traffic, 15,747 (4%) who moved close to traffic, and 17,489 (4%) who moved away from traffic (Table 1).

The baseline characteristics of these subjects are summarized by the 4 exposure groups in Table 1. Fewer than half (46%) of the subjects were male; the average age (SD) was 59 (11) years (range, 45–83 years). Overall, compared with those consistently living away from traffic, persons who consistently lived close to traffic were older and more likely to have lower neighborhood SES and pre-existing comorbidities.

Based on the land-use regression data that incorporated high spatial resolution, persons who consistently lived close to traffic were exposed to elevated concentrations of black carbon, $PM_{2.5}$, NO_2, and NO during the 5-year exposure period (Table 2). Furthermore, those once living close to traffic were also exposed to higher concentrations of black carbon, NO_2, and NO; this increment was even larger for those who moved their residences close to traffic.

During the follow-up period, 3133 people (3097 from the death registration database and 36 from hospitalization records) died of CHD, for an overall mortality rate of 7.6 per 1000 subjects. Compared with subjects consistently living away from traffic, those consistently living close to traffic were 69% (95% confidence interval [CI] = 1.55–1.85) more likely to die of CHD during the follow-up period. For those who moved away from traffic during the exposure period, there was a 4% increase in the risk of CHD mortality (0.87–1.25) during the follow-up period compared with the unexposed. For those moving closer to traffic during the exposure period, the risk of CHD mortality increased 23% (1.03–1.46) as compared with the unexposed. Adjustment for

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TABLE 1. Baseline Characteristics[a] of Study Subjects by Exposure Groups[b]

	Not Exposed to Traffic (n = 328,609)	Moved Close to Traffic (n = 15,747)	Moved Away From Traffic (n = 17,489)	Consistent Exposure to Traffic (n = 52,948)
Men	46	46	47	45
Age (years): mean (SD)	58.7 (10.4)	58.6 (10.2)	57.6 (10.0)	61.0 (10.9)
Age quintiles (years)				
45–48	19	19	21	15
49–53	22	21	23	18
54–60	21	21	21	19
61–69	20	21	20	22
70–83	19	18	15	26
Comorbidity				
Diabetes	1.9	2.1	2.0	2.5
COPD	1.0	1.2	1.2	1.5
Hypertensive heart disease	3.7	4.0	3.9	4.6
Any of the above	5.6	6.4	6.1	7.2
Income quintiles[c]				
1	15	25	20	27
2	18	19	19	20
3	19	21	20	19
4	22	18	22	16
5	26	17	20	19

[a]Percent, unless otherwise specified.
[b]Traffic exposure was defined as ≤150 m from a highway or ≤50 m from a major road.
[c]Quintile 1 represents the lowest and Quintile 5 the highest neighborhood income quintile.

TABLE 2. Average Concentrations of Traffic-related Air Pollutants by Exposure Groups

	Not Exposed to Traffic (n = 306,296) Mean (SD)	Moved Close to Traffic (n = 13,285) Mean (SD)	Moved Away From Traffic (n = 14,582) Mean (SD)	Consistent Exposure to Traffic (n = 50,502) Mean (SD)
Black carbon (10^{-5}/m)	1.1 (0.7)	2.3 (1.1)	1.9 (0.9)	3.0 (1.5)
$PM_{2.5}$ ($\mu g/m^3$)	4.0 (1.6)	4.2 (1.6)	4.1 (1.6)	4.3 (1.8)
NO_2 ($\mu g/m^3$)	31.3 (7.9)	33.9 (7.5)	33.0 (7.6)	35.5 (7.9)
NO ($\mu g/m^3$)	28.8 (8.2)	39.5 (13.4)	34.8 (10.7)	45.9 (16.6)

This is a sub-group analysis for the subjects (93%) with land-use regression data. Traffic exposure was defined as ≤150 m from a highway or ≤50 m from a major road.

baseline age, sex, pre-existing comorbidities, and neighborhood SES generally reduced the relative risks but did not change the overall pattern of the results: the risk of CHD mortality increased by 29% (1.18–1.41), 14% (0.95–1.37), and 20% (1.00–1.43), respectively, for those consistently living close to traffic, moving away from traffic, and moving close to traffic, respectively (Table 3).

Similar CHD mortality patterns were observed when the analysis was repeated using different road types and distances (Table 3, Fig. 1). Figure 1 shows that the risk of CHD mortality was strongly dependent on road types (traffic volume) and the distances from major roadways. For example, for those consistently living close to traffic, the risk of CHD mortality rapidly decreased when the distance from traffic increased from 50 to 150 m, or when road type changed from a highway (21,000–114,000 vehicles/day) to a major road (15,000–18,000 vehicles/day). Overall, compared with consistently living away from traffic, consistently living close to traffic was associated with the highest risk of CHD mortality (Fig. 1); moving closer to traffic was associated with an increased risk but lower risk compared with consistently living close to traffic. Moving away from traffic was associated with a decreased risk but higher risk compared with consistently living away from traffic.

For those consistently living within 150 m from a highway or 50 m from a major road (vs. consistently living >150 m from a highway or >50 m from a major road), the risk of CHD mortality was higher for men than for women and higher for the younger (<65 years) than for the older group (≥65 years) (Fig. 2).

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TABLE 3. Association of Road Traffic Exposure With Coronary Heart Disease Mortality

Exposure Category	Not Exposed to Traffic[a]	Moved Close to Traffic	Moved Away From Traffic	Consistent Exposure to Traffic
≤150 m Highway or ≤50 m major road				
No. deaths/total number	2271/328,609	131/15,747	124/17,489	607/52,948
Crude RR (95% CI)	1.00	1.23 (1.03–1.46)	1.04 (0.87–1.25)	1.69 (1.55–1.85)
Adjusted RR (95% CI)[b]	1.00	1.20 (1.00–1.43)	1.14 (0.95–1.37)	1.29 (1.18–1.41)
≤50 m Highway				
No. deaths/total number	3164/434,602	26/2304	21/2729	73/4343
Crude RR (95% CI)	1.00	1.55 (1.05–2.29)	1.05 (0.69–1.62)	2.33 (1.84–2.94)
Adjusted RR (95% CI)[b]	1.00	1.44 (0.97–2.13)	1.09 (0.71–1.69)	1.54 (1.21–1.96)
≤150 m Highway				
No. deaths/total number	2851/397,341	59/7016	62/8484	257/20,085
Crude RR (95% CI)	1.00	1.18 (0.91–1.53)	1.02 (0.80–1.32)	1.80 (1.59–2.05)
Adjusted RR (95% CI)[b]	1.00	1.22 (0.94–1.59)	1.11 (0.86–1.44)	1.36 (1.19–1.55)
≤50 m Major road				
No. deaths/total number	2674/370,505	90/10,534	88/12,935	330/31,073
Crude RR (95% CI)	1.00	1.20 (0.97–1.48)	0.95 (0.77–1.18)	1.49 (1.33–1.67)
Adjusted RR (95% CI)[b]	1.00	1.16 (0.93–1.43)	1.07 (0.86–1.33)	1.15 (1.02–1.29)
≤150 m Major road				
No. deaths/total number	1752/247,483	157/19,724	170/25,781	1024/112,093
Crude RR (95% CI)	1.00	1.17 (1.00–1.38)	0.97 (0.83–1.14)	1.35 (1.25–1.46)
Adjusted RR (95% CI)[b]	1.00	1.24 (1.05–1.46)	1.09 (0.93–1.28)	1.11 (1.02–1.19)

The total number of subjects in each traffic exposure category is different due to exclusion of subjects with multiple changes in exposure status and subjects who changed their exposure status during the follow-up period.

[a]Reference category.

[b]Adjusted for age, sex, neighborhood socioeconomic status, and pre-existing comorbidities.

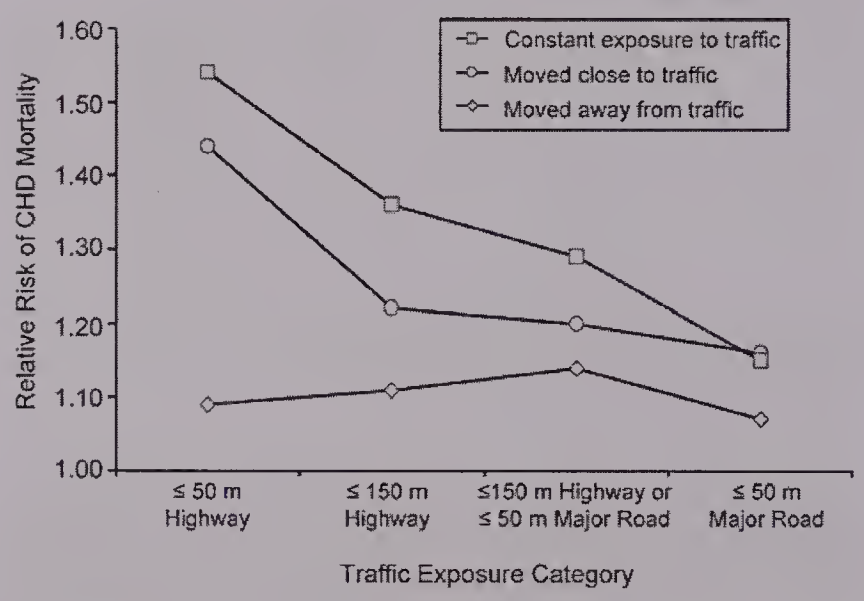

FIGURE 1. Association of road traffic exposure with coronary heart disease mortality by road types and distances. RRs adjusted for age, sex, neighborhood SES, and pre-existing comorbidities.

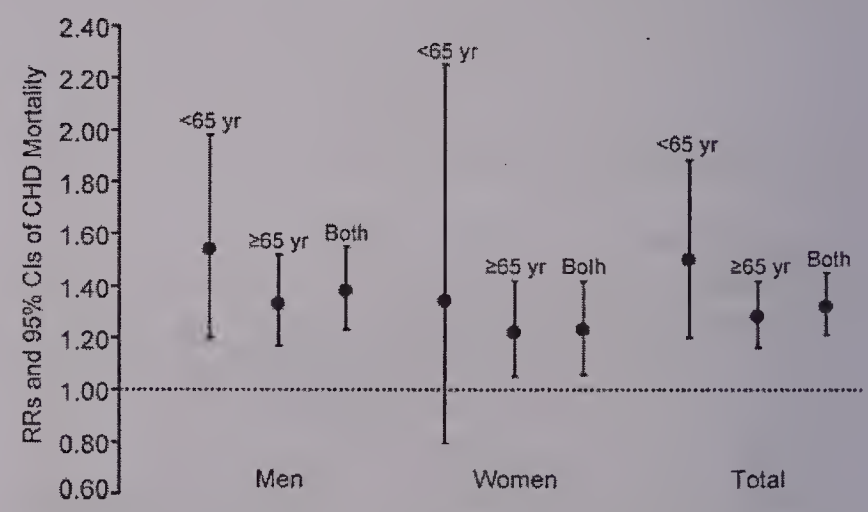

FIGURE 2. Association of road traffic exposure with coronary heart disease mortality by sex and age (traffic exposure was defined as ≤150 m highway or ≤50 m major road). Adjusted for neighborhood SES and pre-existing comorbidities; the combined analyses ("Both") were additionally adjusted for age (<65 years, ≥65 years); for the total group, the analyses were additionally adjusted for age (<65 years, ≥65 years) and sex.

In the sensitivity analysis examining the effects of distances and reference groups, for those who moved away from traffic during the exposure period, the effect estimates were very close among the 3 groups (Fig. 3). However, for those who moved close to or consistently lived close to traffic, the effect estimates changed in response to different distances and references used in the analysis, indicating that the observed association between residential proximity to traffic and the risk of CHD mortality was sensitive to distances from highways and the references used for comparison.

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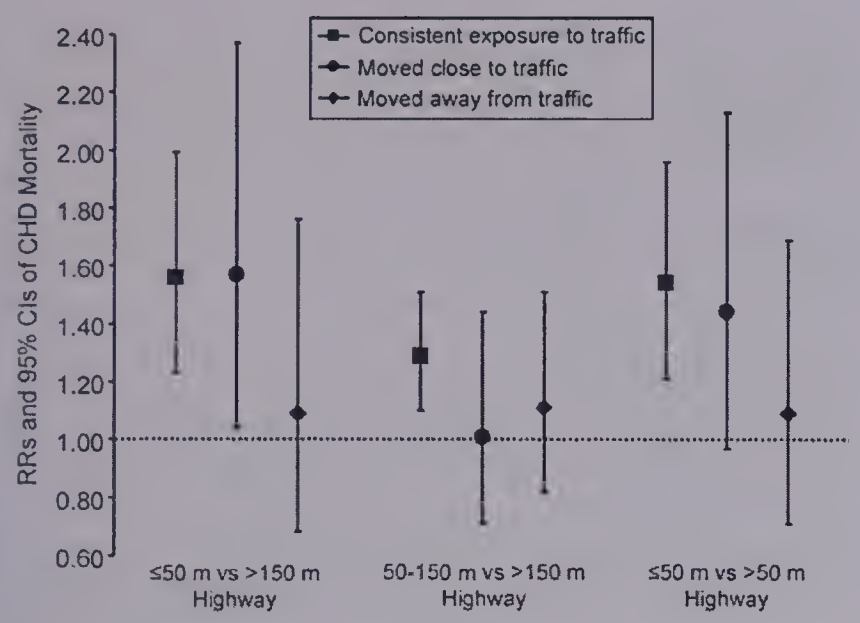

FIGURE 3. Association of road traffic exposure with coronary heart disease mortality by distances from highways. Adjusted for age, sex, neighborhood SES, and pre-existing comorbidities.

DISCUSSION

In this large population-based cohort study with detailed residential-history information, living close to road traffic was associated with an increased risk of CHD mortality. More importantly, a change in residential proximity to traffic was associated with an altered risk of CHD mortality: moving close to traffic was associated with a relatively increased risk, whereas moving away from traffic was associated with a relatively decreased risk.

Previous studies examining the associations between residential proximity to traffic and cardiovascular outcomes have not reported entirely consistent findings. A cross-sectional study carried out in Germany with 4494 participants found that living close to a major road was associated with more severe coronary artery calcification.[11] In contrast, a recent study with 1147 participants in the United States found no appreciable association between residential proximity to a major road and abdominal aortic calcification.[12] In a 13-year cohort study of 13,309 people in the United States, Kan et al[13] found that residential traffic intensity was associated with an increased risk of fatal and nonfatal coronary events. Similarly, in a large case-control study, Tonne et al[14] reported that living near a major road was associated with a 5% increase in the risk of acute myocardial infarction. A 13-year cohort study of 4800 women in Germany also found that living within 50 m of a major road was associated with increased cardiopulmonary mortality.[15] In contrast, in a 9-year Dutch cohort study with 117,528 participants, Beelen et al[16] did not find an association between residential proximity to a major road or residential traffic intensity and cardiovascular mortality. Several studies have also reported associations between exposures to traffic-related air pollutants such as nitrogen oxides and adverse cardiovascular outcomes.[17–19] Because of differences in traffic characteristics, study populations, meteorological and geographic conditions, study design, and statistical methods, it is difficult to quantitatively compare the results from different studies. Although the findings from these previous studies are not fully consistent, the present study and most previous studies suggest that residential proximity to traffic is associated with increased risk of CHD mortality. Traffic-related air pollution and other factors such as traffic noise may be responsible for the observed association.

Compared with previous reports, this study has several important strengths: First, this population-based cohort study may be regarded as a natural experiment in which we took advantage of detailed residential histories to investigate the relationship between changes in traffic exposure status and the risk of CHD mortality. Changes in residential proximity to traffic were associated with an altered risk of CHD mortality in an exposure-response fashion.

Second, we used various road types (highway or major road) and distances (≤50 or ≤150 m) from major roadways to assess residential proximity to traffic. The observed association was consistent across various combinations of road types and distances. The effect estimate was dependent on road types (traffic volume) and distances in a dose-response fashion (Table 3, Fig. 1).

Third, residential proximity to traffic was consistent with land-use-regression-model estimates for the concentrations of black carbon, nitrogen dioxide (NO_2), and nitric oxide (NO) (Table 2). These results are consistent with those of previous studies, and suggest that residential proximity to traffic is a simple and specific surrogate that reflects spatial variability of traffic-related air pollution.[5,6] In a separate analysis of associations between these 4 pollutants and the risk of CHD mortality, we found that an interquartile range elevation in the concentrations of black carbon was associated with a 6% (95% CI = 1.02–1.09) increase in the risk of CHD mortality after adjustment for all the covariates and 3 other copollutants ($PM_{2.5}$, NO_2, and NO); the corresponding relative risk for $PM_{2.5}$, NO_2, and NO was 1.00 (0.97–1.04), 1.04 (1.00–1.09), and 1.02 (0.97–1.08), respectively (Gan WQ, Koehoorn M, Daves HW, Demers PA, Tamburic L, Brauer M. Submitted paper).

Fourth, this study found that 47% of study subjects changed their residences at least once during the 9-year study period, leading to a change in the residential traffic exposure status in 15% of the subjects. When residential proximity to traffic at the original address (January 1994) was used to evaluate traffic exposure status (and subsequent residential relocations were ignored), the corresponding adjusted RRs (95% CI) for the 5 exposure categories were: 1.19 (1.10–1.29), 1.34 (1.10–1.64), 1.27 (1.13–1.42), 1.09 (0.99–1.21), and 1.06 (0.99–1.14) (Table 3, from the first to the fifth row). Thus, previous studies that have not accounted for residential relocation may have suffered from substantial exposure mis-

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classification. This may result in underestimations of the true adverse health effects, and even false-negative results.

This study had several limitations that should be considered when interpreting these findings. The study cohort was constructed using linked administrative databases that did not include certain important information about individual cardiovascular risk factors (such as active or passive smoking status, body mass index, and individual SES). To partially control for these unmeasured risk factors, we adjusted for age, sex, neighborhood SES, and pre-existing comorbidities including diabetes, COPD, and hypertensive heart disease. Because these comorbidities and CHD share common behavioral risk factors, adjusting for these pre-existing comorbidities was presumably able to reduce the influence of uncontrolled factors, such as cigarette smoking, to some extent.[24] However, these approaches cannot eliminate all confounding effects caused by unmeasured cardiovascular risk factors.

Cigarette smoking is the single most important risk factor for CHD.[25] If smokers are more likely to live near (or move closer to) major roadways, the observed association may be confounded by the effects of cigarette smoking. However, previous epidemiologic studies have demonstrated that the association of air-pollution exposure with the severity of atherosclerosis[11,26] or the risk of CHD mortality[3,27] was independent of cigarette-smoking status and even stronger among never-smokers.[3,11,26,27] For example, Pope et al[3] reported that for each 10 $\mu g/m^3$ increase in annual average concentration of $PM_{2.5}$, the adjusted relative risk of CHD mortality was 1.22 for never smokers, 1.15 for former smokers, and 1.16 for current smokers. Given these findings and the lack of evidence to suggest that cigarette smoking is related to changes in residential proximity to traffic, it is less likely that the observed associations were due to confounding effects of cigarette smoking.

Low SES is a risk factor for CHD[28] and is also related to other cardiovascular risk factors such as cigarette smoking, obesity, and hypertension.[29–31] In some locations, people with low SES are more likely to live close to major roadways.[32] Individual SES is thus a possible confounder for the observed association. In the present study, we used neighborhood-income quintiles to approximate the major differences of economic status between subjects with various traffic-exposure profiles. Although this method may induce a degree of SES misclassification, some evidence has suggested that this approximation is acceptable for group comparisons.[33] In addition, some studies have found that neighborhood SES is associated with the risk of CHD independent of individual SES, indicating that adjustment for neighborhood SES may also reduce the influence of uncontrolled factors related to neighborhood disadvantages.[31] We used neighborhood income quintiles derived from the 2001 census data, which may not accurately reflect the original neighborhood SES for subjects who changed their residences during the exposure period (January 1994–December 1998). Nevertheless, there is evidence that the levels of neighborhood SES are well correlated for those who change their residences.[31]

Residential proximity to traffic is a relatively crude surrogate for exposure to traffic-related air pollution. Many factors, such as wind direction, presence of street canyons, and specific residence characteristics, may influence actual residential exposure levels.[34,35] Moreover, in the present study, residential proximity to traffic was estimated using the postal code centroid rather than the actual residential address. In urban areas, a 6-digit postal code typically represents one side of a city block or individual multiunit structures and is therefore fairly precise. Still, this assessment of traffic proximity will inevitably induce exposure misclassification. Furthermore, as in previous studies, our exposure assessment can only approximately reflect the exposure levels at subjects' residences, which may not precisely reflect actual individual exposure levels. Mobility,[36] outdoor activity, and indoor infiltration of air pollutants[37] may differ across study subjects. Nevertheless, all these factors presumably cause nondifferential exposure misclassification, leading to underestimations of the true adverse effects of residential proximity to traffic.

Finally, residential proximity to traffic signifies exposure not only to traffic-related air pollutants but also to traffic-related noise. Some studies have indicated that traffic-noise levels are at least moderately correlated with the concentrations of nitrogen oxides[38] and also with increased risk of CHD.[39] Therefore, it is possible that the increased risk of CHD mortality observed in the present study may be associated with both traffic-related air pollution and traffic noise. We cannot disentangle the effects of these 2 traffic-related pollutants in the current analysis.

An enormous number of people are regularly exposed to traffic; therefore, traffic-related air pollution may represent an important public-health problem. Using a large population-based cohort study with detailed residential history information, we observed that living close to traffic was associated with an increased risk of coronary mortality, whereas moving away from traffic was associated with a decreased risk.

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WZ.1 **Contaminated soil.**

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

Matthew Beaton, Secretary
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office / MEPA Analyst Alex Strysky
100 Cambridge Street, Suite 900
Boston MA 02114

Via email to Mr. Alex Strysky
RE: EEA#15889, ENF, Union Square Redevelopment, Somerville MA

Secretary Beaton,

I am a resident of Union Square, and also serve as the co-chair of the Union Square Neighborhood Council, and a member of Fossil Free Somerville. I would like to write in opposition to the proposed Phase 1 Waiver for the Union Square Redevelopment.

There are numerous reasons to oppose this waiver. The legacy of industrial uses in the D2 parcel alone suggests that a thorough environmental impact review is necessary to ensure the health of the land and groundwater. Samples taken from the D2 parcel in 2010 found several carcinogenic contaminants within 3 feet of soil. Current sampling should re-evaluate the presence and concentration of these contaminants, and the proper method for remediation. This review is key to ensure the protection of our groundwater, and the future health of those inhabiting the living, work and civic spaces. RW.1

The increased projected use of the D2 parcel extends beyond Phase 1, and the transportation and infrastructure analyses should reflect this. In conjunction with the introduction of the Green Line to Union Square, the development of lab and living spaces will increase the already-congested Prospect Street. The Proponent has passed the threshold for the EIR in terms of vehicle trips and parking, which translates to increased air pollution to the proposed civic space adjacent to Prospect Street. If this space is to be truly civic, environmentally sound and enjoyable, it should be protected from city congestion, not central to it. RW.2 RW.3

Finally, the impacts of climate change will be significant, and thorough examination of mitigation for flooding from storm events is critical. The City's Climate Change Vulnerability Assessment (CCVA) highlights the whole of Union Square as vulnerable to flooding. The current drainage infrastructure (while being upgraded) does not have adequate adaptive capacity to handle the increased severity of storms caused by climate change. Further, the consideration of natural gas infrastructure alongside the lack of commitment to renewable energy do not suggest contribution to the City's objective for carbon neutrality in 2050. RW.4 RW.5

To conclude, I oppose the waiver and I would recommend full environmental review for Phase 1 of the Union Square Redevelopment.

Sincerely,
Rachel J. Weil
Union Square Neighborhood Council, Co-chair
Fossil Free Somerville, Member

RW.1 **Contamination.**

Chapter 8 of the DEIR discusses the anticipated approaches to achieve a level of No Significant Risk on applicable sites.

RW.2 **Transportation and infrastructure of D2.**

Chapter 4 of the DEIR includes a Transportation Impact Assessment for the Project. Chapters 9 and 10 provide information on stormwater, wastewater and water infrastructure.

RW.3 **Air pollution.**

In direct response to these community comments, the Proponent has improved the D2 design by increasing the size of the plaza by 25% and has also added a new publicly-accessible green space of approximately 3,000 sf on D2 near the MBTA station platform. In addition, the plaza has been widened to create greater horizontal separation from Prospect Street vehicles. The elevation of the plaza has also been set at approximately the same elevation as the adjacent Union Square Station allowing the southern 150 feet of the plaza to benefit from being approximately seven vertical feet below Prospect Street. The largest portion of the plaza, where people are most inclined to congregate, is at the southern end of D2 and benefits from the most vertical separation from Prospect Street (approximately 10 to 14 vertical feet). A vegetated landscape buffer has also been planned between the Prospect Street sidewalk and the main pedestrian areas of the plaza to further separate main pedestrian areas on the plaza from the vehicles.

RW.4 **Flooding.**

Chapter 9 of the DEIR provides information about existing and proposed storm drain infrastructure, as well as stormwater management. In addition, Section 10.1.3 includes information regarding infiltration and inflow mitigation. Section 1.1.2, Streetscape and Infrastructure Improvements, also includes additional details about the City's expansion of neighborhood stormwater infrastructure and the Project's contributions to that effort.

RW.5 **Renewable energy and natural gas.**

The Proponent will continue to evaluate renewable energy options for the Project, and the energy that the Project uses as the design progress.

Strysky, Alexander (EEA)

From: Malcolm Cummings <malcolm.cummings@gmail.com>
Sent: Friday, August 24, 2018 4:43 PM
To: Strysky, Alexander (EEA)
Subject: RE: EEA#15889, ENF, Union Square Redevelopment, Somerville MA

Friday August 24, 2018

Matthew Beaton, Secretary

Executive Office of Energy and Environmental Affairs
Attn: MEPA Office / MEPA Analyst Alex Strysky
100 Cambridge Street, Suite 900
Boston MA 02114

Via email to Mr. Alex Strysky

RE: ***EEA#15889, ENF, Union Square Redevelopment, Somerville MA***

Dear Secretary Beaton,

The proponent US2 and SRA are requesting a phase 1 waiver for the Union Square Redevelopment in Somerville MA. I am deeply concerned that this waiver would eliminate the capacity of the community to fully understand the environmental impact of the development until after construction has begun or been completed. The waiver should not be granted.

The carbon footprint of this development must be minimized and well understood. Granting the waiver will eliminate an important step in this process. The greenhouse gas emission analysis has not adequately quantified MC.1 the impact of this development, nor does the proposed design take sufficient measures to avoid, minimize or mitigate the emissions. The outright rejection of building orientation as a method of energy efficiency gains is a very unfortunate design choice on the part of the proponent. Building orientation can significantly impact the passive heating and cooling performance of a building by optimizing sun exposure to various design features. This is particularly important in how the orientation of the Phase 1 development may impact design elements of the later phases of construction. Granting a Phase 1 waiver will allow construction to proceed before we understand the impact on later phases.

The proponent does not have detailed construction drawings and is unable to commit to a high-performance building envelope to improve heating energy efficiency. A high-performance building envelope is necessary for this development to achieve low carbon emissions, especially in the absence of passive thermal efficiency associated with building orientation as mentioned above. Changes to a building envelope after construction has begun or been completed are often prohibitively costly. A waiver should not be granted in the absence of a detailed analysis of and commitment to a high-performance building envelope.

Ultimately, a LEED Gold rating is completely insufficient for a building to reach zero carbon emissions by 2050 (Somerville's stated goal) without major retrofitting in the near term. There are many other design options for designing and analyzing a building of this scale, including passive house performance standards, that have not been evaluated by the proponent. The Proponent has not used all the resource available to minimize

greenhouse gas emissions and should not receive a waiver. The community and commonwealth would be best served by not granting this waiver.

Sincerely,

Malcolm Cummings
Fossil Free Somerville

MC.1 GHG analysis.

Chapter 7 of the DEIR includes a greenhouse gas analysis that complies with the MEPA Greenhouse Gas Emissions Policy and Protocol (GHG Policy) of May 2010, and includes information about building envelopes and other measures to reduce the Project's greenhouse gas emissions.

To: Secretary Matthew Beaton, Energy and Environmental Affairs
Via: Alex Strysky, MEPA Office, 100 Cambridge St Suite 900, Boston, MA
From: Anson Stewart, 27 Adrian Street, Apt. 1, Somerville, Mass
Mike Firestone, 97 Prospect Street, Unit 4, Somerville, Mass
Date: August 24, 2018
RE: EEA No. 15889 – US2 and City of Somerville Phase 1 Waiver for Union Square

We are Somerville residents generally inclined to support expediting dense, mixed-use, affordable, transit-oriented development. For this waiver to be granted, however, the proponents must demonstrate that "the potential impacts of phase one, taken alone, are insignificant," 301 CMR 11.11(4)(a). For the reasons outlined below, we believe the proponents fail to demonstrate that the potential traffic impacts of Phase One are insignificant.

Equally, for a waiver to be granted, the proponents must demonstrate that "the Project is severable, such that phase one does not require the implementation of any other future phase of the Project or restrict the means by which potential environmental impacts from any other phase of the Project may be avoided, minimized or mitigated, 301 CMR 11.11(4)(c). For the reasons outline below, we believe that US2 cannot make such a showing.

Finally, it is our belief that any determination of severability is inconsistent with the intent of the City of Somerville and the Somerville Redevelopment Authority as detailed in the Master Development Designation Agreement[1] and the Master Land Disposition Agreement.[2] These public bodies entered into an agreement to designate US2 as the Master Developer of 15 acres of Union Square, including the D2 block, "to accomplish the revitalization of Union Square" through a comprehensive project-wide strategy, and not a parcel-specific one. To move forward with a Phase 1 waiver in our view meaningfully limits environmental impact mitigation through the consideration of alternatives to *only* those achievable on the individual parcel. As described below, we believe that US2, at a minimum, must consider project alternatives to achieve mitigation that leverages its unique scale and acreage as Master Developer.

We accordingly believe that a Phase One waiver is not warranted, and that if it is granted, should be subject to strict conditions related to transportation and exploration of mitigation alternatives outside the D2 block.

Traffic Generation Significance Thresholds:

MEPA uses two relevant average daily trips (ADT) thresholds to gauge the significance of traffic impacts (301 CMR 11.6). Projects generating more than 3,000 ADT are subject to a mandatory EIR, and projects generating more than 2,000 ADT are subject to Other MEPA Review if the Secretary So Requires.

Following basic Institute of Transportation Engineers ("ITE") trip generation methodology, the first estimate of ADT generated by Phase 1 is 4,968. US2's Transportation Impact Study ("TIS") adjusts this value downward significantly.[3] While the general use of such an adjustment process is appropriate given

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[1] Available at http://unionsquareneighborhoodcouncil.org/images/resources/US2-Union-Square-Master-Developer-Designation-Agreement.pdf
[2] Available at https://www.somervillema.gov/sites/default/files/US2%20-%20Union%20Square%20Master%20Land%20Disposition%20Agreement%20-%202.16.17.PDF
[3] The TIS calculates an estimated number of person trips (6,217), then divides these person trips using assumed mode shares to arrive at an adjusted value ADT of 2,089 vehicle-trips.

the project context, the proponents' methodology and assumptions should be subject to rigorous scrutiny. We wish to note three concerns:

1. *The analysis presumes a reduction in vehicle usage that has not occurred*

   The city's representative at the MEPA site visit stated US2 had made a "binding commitment" to achieve a 60% mode share target (i.e. up to 40% of person trips made by automobile). US2 states that this commitment is to be achieved through a mobility management plan, but further details are lacking. To their credit, the proponents do admit that the mobility management plan may not be effective in achieving traffic reduction targets, but their failure to analyze the full level of potential traffic generation inhibits an informed discussion of the magnitude of such impacts. AS.1

2. *Using inappropriately aggressive mode share values*

   The 40% target for automobile mode share is a laudable aspiration, and we sincerely hope the project will meet it. But in considering the waiver application and for public consideration of environmental impacts, a more conservative estimate is warranted. More appropriate mode shares for estimating ADT could be derived from current neighborhood automobile mode shares (66%, as calculated from TIS Table 6) or the city's comprehensive plan (50%, as noted at the site visit). The ADT values corresponding to these more conservative assumptions are 4,103 and 3,109. AS.2

3. *Double-counting internal trips*

   The use of an "internal capture" rate to reduce ADT by an additional 15% is also dubious. Presumably, trips within the D2 block would be walking trips, already accounted for in the 60% non-auto share. If the "internal capture" rate is applied to trips taken by automobile, as the TIS numbers suggest, it implies that more than 300 daily trips are made *driving within* the Phase 1 site. Double counting should not be allowed. AS.3

In short, while reducing ADT to 2,089 or below corresponds with environmentally laudable goals, it is arguably inappropriate as a Phase 1 traffic generation value for MEPA purposes; ADT estimates based on appropriately conservative assumptions (e.g. 3,109, as described above) present a more accurate picture of the potential impacts.

Finally, even if one accepts the adjusted ADT value of 2,089 at face value, the Phase 1 project on its own exceeds an identified trip threshold in 301 CMR 11.6(b), which simply cannot be determined an "insignificant" impact under the Phase 1 Waiver rules, 301 CMR 11.11(4)(a).

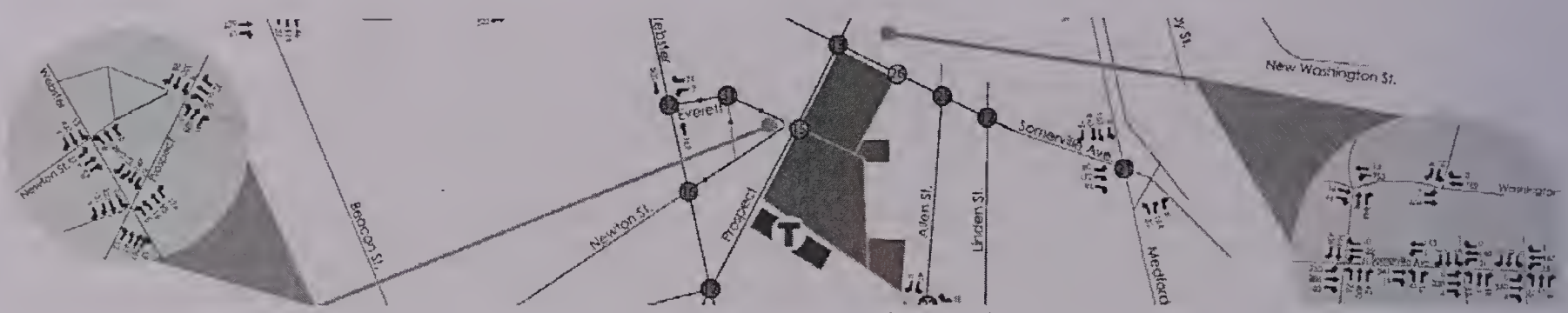
MEPA Conditions:

Thorough MEPA review requires an informed consideration of alternatives and potential mitigation of project impacts. The Secretary should not grant proponents' waiver request until there has been such consideration. We suggest the following:

1. *Less parking on the D2 block, move parking to D1*

   Locating the hulking D2 parking structure, with the proposed 290 parking spaces, immediately adjacent to the Green Line station, puts vehicular traffic in conflict with pedestrians and bicyclists accessing the station. In particular, the TIS estimates 144 vehicles per peak hour

turning between Prospect Street and the proposed Driveway 2 at Intersection 15, which most passengers using the Green Line Station would be forced to confront.



Excerpt of Figure 33: 2025 Build AM Peak Hour Traffic Volume

To mitigate these conflicts, the proponent should analyze alternatives with less total parking, and with some of the proposed D2 parking moved across Somerville Avenue to D1. The D1 block is much better suited to parking -- it already has vehicular access from Somerville Avenue and Washington Street, and it is more convenient to regional commuters using McGrath Highway. The premise of the Master Development Designation Agreement is that parcels are not developed in isolation. Indeed, the best alternatives for mitigating transportation impacts will likely involve creative and synergistic uses of the different sites in Union Square. For example, the ENF references "the ability to manage parking supply and demand in a flexible, rational and innovative manner to balance transportation," and the proponents repeatedly mentioned "shared parking" in the site visit.

In short, we believe a Phase 1 waiver should not be granted without full analysis of the environmental benefits of reduced parking and of shifting parking to the D1 parcel or other sites under control of US2. Allowing the waiver without such consideration is inconsistent with 301 CMR 11.11(4)(c)) and the goals of the Master Development Designation Agreement.

2. *Assess alternatives for Intersection 15*

The Prospect/ Everett intersection (Intersection 15) will interact substantially with congestion from the saturated Somerville/ Washington/ Prospect intersection (Intersection 13) and warrants rigorous attention. As shown in the figure above, the TIS estimates 98 (78 + 20) vehicles per AM peak hour making left turns between Prospect Street and Driveway 2. These turning movements would be subject to impedance from not only pedestrians walking on Prospect St (e.g. to/from the Green Line Station), but also northbound traffic on Prospect Street.

Table 51 in the TIS omits LOS and delay estimates for this northbound traffic, which is part of the Prospect St NB LTR approach to Intersection 13. The no-build AM peak volume/capacity ratio for this approach is 1.21 (Table 47). The build alternative increases this ratio to 1.42 (Table 52). Traffic generated by Phase 1 increases this delay by 89 seconds, bringing the delay for vehicles approaching Intersection 13 on Prospect St NB to nearly 4 minutes. Exceeding capacity for this approach by 42% is likely to cause ripple effects throughout the area. Vehicle queues on Prospect St NB will severely impede left turns at Intersection 15; with only one combined lane for LTR movements from Prospect St SB, vehicles waiting for a gap to turn left to Driveway 2 will block through traffic, which could easily spill back and block Intersection 13. The TIS estimates that the average delay for Prospect St SB at Everett St. is 2.5 seconds, but provides no details on the pedestrian impedance values, gap acceptance process, or platoon dispersion process from the upstream Intersection 13 signal used to calculate this value.

The proponent should provide a more thorough explanation of assumptions used to calculate impacts at these critical intersections, and analyze alternative designs for Intersection 15 (e.g. with left turns between Prospect St SB and Driveway 2 prohibited). AS.4

3. *Do not preclude, and consider providing, bus improvements as part of the MBTA Better Bus Project or other initiatives*

   The proponents' transportation consultant expressed the hope that the MBTA's phased Better Bus initiative would improve bus service in the area. The proponent should coordinate with the MBTA to ensure that the development of Phase 1 does not negatively affect current or planned bus service. Plans for maintaining and improving access to the existing CT2 stop on Prospect St. NB should be detailed. Furthermore, the MBTA will consider route changes as part of this initiative, possibly including re-routing 91 and CT2 service from Sullivan Square to continue straight onto Prospect Street SB, rather than turning right onto Somerville Ave at Intersection 13. Given projected traffic delays at Intersections 13 and 15, discussed above, passengers on these buses, as well as routes along Somerville Ave affected by a blocked intersection, would be faced with substantial delays. The proponent should consider concrete bus priority infrastructure that would mitigate these delays. AS.5

Conclusion:

The D2 site presents a unique opportunity to add new development adjacent to a new transit station, but without careful planning and consideration of project-wide environmental mitigation, the project is unlikely to achieve the City's and the Commonwealth's environmental goals.

Thank you for your thoughtful consideration of our concerns.

Sincerely,

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AS.1 **Traffic analysis presumes a reduction in vehicle usage that has not occurred.**

The Transportation Impact Assessment included in Chapter 4 of the DEIR has been prepared based on guidance from MassDOT and the City of Somerville, and is consistent with MassDOT's *Transportation Impact Assessment Guidelines* (2014). The Project includes Mobility Management Plans that will be enforceable and will be intended to ensure that vehicle trips are reduced the extent practicable.

AS.2 **Mode share.**

The Transportation Impact Assessment, including the mode share values and methodology, were determined through coordination with MassDOT and the City of Somerville. The Project includes Mobility Management Plans that will be enforceable and will be intended to ensure that vehicle trips are reduced the extent practicable.

AS.3 **Internal capture rate.**

The DEIR trip generation/mode share analysis was coordinated with the City of Somerville as part of the overall analysis.

AS.4 **LOS and delay estimates.**

Analysis was completed in coordination with the City of Somerville and MassDOT guidance and to the extent possible incorporates roadway and intersection improvements planned by the City of Somerville. The DEIR describes this level of incorporation which further recognizes that the Proponent has committed overall funding and ongoing cooperation with efforts to further allow the City to determine the success of implemented measures and modify as needed.

AS.5 **Coordination with MBTA.**

The DEIR includes a detailed transit analysis following the express guidance of MassDOT and the MBTA, per their request.

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